

GAMES MASTER FOR THE SAM COUPE

At last YOU can create stunning games and demos for the Coupe, with fast, smooth, animated sprites, complex sound effects, missiles, platforms, lifts, detailed backgrounds etc. No programming expertise required! Most of a game's design is specified by the menu-driven editor, which lets you edit graphics, animation, movement, sprite collision actions, sound effects, masking, control keys etc. A simple but very fast compiled language controls some features. A complex demo with animated bouncing sprites passing over and under each other, in front of a background, can be written with just a few commands to start the sprites off. (Once started, the sprites can act by themselves.) The editor produces stand-alone ROM-independent CODE programs that are free from any copyright restrictions - so you can sell your masterpiece! Impressive demonstration programs and an extensive sprite library are included to get you started. Backgrounds and sprites can also be grabbed from any Mode 4 screen and edited.

SIX SPRITE PLANES PLUS BACKGROUND
BIG SPRITES - UP TO A THIRD OF THE SCREEN AREA
TRUE COLLISION DETECTION ON SPRITE EDGE
SMOOTH, FAST PIXEL MOVEMENT OVER 100 ON-SCREEN SPRITES
POWERFUL EASY TO USE EDITOR COMPILED CONTROL LANGUAGE
COMPLEX MOVEMENT PATTERNS AND ANIMATION SEQUENCES
STEREO SPRITE-FOLLOWING SOUND EFFECTS

Written by Dr Andy Wright, author of the Sam ROM, MASTERDOS and MASTERBASIC, the program works with 256K or 512K RAM and ROM 2.0 and above. A comprehensive manual is included.

GAMES MASTER COSTS JUST £24.99 INCLUSIVE OF POSTAGE AND PACKING (ADD £1 IF OUTSIDE EUROPE)
SPECIAL PRICE TO INDUG MEMBERS: £22.50 (QUOTE MEMBERSHIP NUMBER)

FILE MANAGER is a flexible file program for the Sam Coupe. Up to 26 fields per record - up to 248 characters per field. Field length may vary from record to record. Files up to 780K long. Add new fields to existing files. Select records, sort, display, print, delete or save selected records. Delete contents of one field or fill a field with same information in all selected records. Merge files with the same file structure. Sort by any field, and fine sort by any number of other fields. Unlimited user-defined screen and print layouts. Headers, page numbers and multiple copy printouts available. Written in MASTERBASIC - no machine code - tailor program to your individual requirements. Requires MASTERDOS/MASTERBASIC v. 1.7 or later (Return your original disk for free upgrade if required - enclose SAE if not buying anything)/ROM 3/1MB extension or twin disk drives. (512K unexpanded Sam Coupe with one drive can use program, but with reduced file capacity - 280K maximum).

FILE MANAGER costs just £12.99 including postage and packing.

Also available: MASTERDOS £15.99 and MASTERBASIC £15.99
BUY ANY 3 PROGRAMS, GET £10 OFF!

Make cheques and postal orders payable to:
BETASOFT, 24 WYCHE AVENUE, KINGS HEATH, BIRMINGHAM, B14 6LQ

Vol.5 - No 9.

May 1992.

FORMAT

FOR SPECTRUM AND SAM USERS



Is It Really Only Ten Years?

£1.25 (UK R.R.P.)

ISSN 0963-8598.

CONTENTS

Vol.5 No 9.

May 1992.

SAM PRODUCTS

- PRO-DOS** - Allows you to run CP/M 2.2 programs on SAM. Comes on two discs with a comprehensive 68 page manual. £30
- PRO-DOS PD1** - A collection of PD programs including a wordprocessor, Spreadsheet, etc. Over 700K of software. (includes tutorial) Just £1 if ordered with PRO-DOS, otherwise £2.
- The P.A.W.** - The Professional Adventure Writing system from Gilsoft. For use under PRO-DOS. Includes two manuals and all files for writing text adventures. £22.50
- SAMPLIFIER** - Stereo Amp powered from SAM. Drives speakers or phones. Plugs into light-pen socket. Amplifier alone £20, with speakers £25, with headphones £23

SPECTRUM PRODUCTS

- +2A MOD KIT** - Converts a +2A into a standard +2. This allows the PLUS D; DISCIPLE and INTERFACE 1 to operate properly. Gives you two expansion ports. Includes ROM, two port FIXER2 and full fitting instructions/manual updates. £19.50
- THE FIXIT** - Converts the +3 and +2A expansion port so that some 48K add-ons will work. £9.50
- VTX5000** - V23 direct connect modem with viewdata software in ROM. 48K. 128K and grey +2 - £15. +2A/+3 (includes FIXIT) - £22.50
- PD TAPE 01** - Spectrum comms software for VTX5000 and RS232s. £1
- USER-USER** - Two VTX5000s (48K) with a tape containing software to allow direct transfer of software between users via the phone. (Tape easily cloned for other user). £30
- µ SLOT** - Two port adaptor for any Spectrum. One facing up the other back. £3
- MEMBRANES** - Keyboard membranes at keen prices. Full instructions. 48K Rubber type machine - £4.50. 48K+/128K - £7.50
- +3 CP/M+ and HALLARD BASIC** - Written by Locomotive Software. Includes 3" disc with software, utilities and a very detailed manual. £29
- +3 PD DISC** - CP/M and +3 software, includes 706K B: drive formatter, and 203K A: drive formatter. £2

Please allow 28 days for delivery. All prices include UK P&P.
Overseas orders: add £2 on modems; PRO-DOS or +3 CP/M, £1 on other items.

B.G.SERVICES.

64, Roabuck Road, Chessington, Surrey, KT9 1JX. Tel: 081 397 0763

News On 4.....	4
The Editor Speaks.....	5
Short Spot.....	7
Thought Spot.....	13
Nev's Help Page.....	17
Small Ads.....	19
Hacker's Corner.....	20
PRO-DOS Reviewed.....	23
Xmas Wordsquare Results.....	26
Machine Code Without Tears 9..	27
Your Letters.....	33
MODULA 2 Reviewed.....	37
FORMAT Readers Service.....	39

THIS MONTHS ADVERTISERS:-

BETASOFT	Back Cover
B.G.SERVICES	2
CHEZRON SOFTWARE	16
FRED	38
HILTON COMPUTER SERVICES	12
OMNIDALE SUPPLIES	22
PBT ELECTRONICS	32
S.D.SOFTWARE	6
SIGMASOFT	31
STEVE'S SOFTWARE	36

FORMAT ISSN 0963-8598.

(C)Copyright 1992 FORMAT PUBLICATIONS. All Rights Reserved.

No part of this publication may be reproduced, in any form, without the written consent of the publisher. FORMAT readers may copy program material only for their own personal use. While every effort is made to ensure accuracy in FORMAT the publisher will not be held liable for any errors or omissions.

FORMAT is published by FORMAT PUBLICATIONS.

34, Bourton Road, Gloucester, GL4 0LE, England.

Telephone 0452-412572. Fax 0452-380890.

Printed by D.S.LITHO. Gloucester. Telephone 0452-523198.

NEWS ON 4

ZX92 POSTPONED

ZX92, the birthday calibration for the Spectrum, has been postponed. Organizers blame problems with the venue in Cambridge.

It is hoped that a new location can be found and that plans can be made for ZX92 to be held later this year. Hopefully the organizers will find a hall with a larger capacity, this would allow many more Spectrum users a chance to attend. If you are interested in attending then send a SAE to:- ZX92, 24 Wyche Ave, Kings Heath, Birmingham, B14 6LQ.

+3 SPECFILE

B.D. Software have announced a +3 disc version of their highly acclaimed SPECFILE+ program. Containing all the features of the original DISCIPLE / PLUS D version it is supplied on standard 3 inch disc for the +3.

This is SD's first venture into the +3. Nev Young told Format "SPECFILE+ has been selling very well, but we thought a +3 version would open a new market".

PAW FOR SAM

The Professional Adventure Writing System (PAW for short) is now available for SAM from B.G. Services.

The CP/M version of the PAW is being sold to run under B.G. Services's Pro-Dos system (reviewed in this issue). Adventures written with this version of PAW will run on SAM under Pro-Dos and will also run on Amstrad PCW and CPC machines. The package comes complete with two comprehensive manuals and costs £22.50.

ALL FORMATS DITCH LONDON VENUE

The New Horticultural Hall will no longer play host to the London All Format Shows. Blaming stiff increases in the price for hire show boss Bruce Everise said "it was just common sense

to look for new venues". He went on to site better parking and road links as one of the main things he is looking for in a new venue.

The first show away from central London was held on the 14th March at the Novotel in Hammersmith. Because of the late change the organizers laid on a coach service from the Horticultural Halls to the Novotel.

The next London show, on the 16th May, will be held at Sandown Racecourse, just off the M25 (junction 10), ample parking and a more modern venue.

ADVENTURE DISCS FOR PLUS D

Compass Software are selling two compilation discs of adventure programs for the Spectrum with PLUS D / DISCIPLE disc systems. Both compilation are available on 3.5" disc at £2.99 each or 4.99 for both.

Mostly written with the PAW some have special features written by the author Jon Lemmon. For more details write to Compass Software, 111 Mill Road, Cobholm Island, St. Yarmouth, Norfolk, NR31 0BB.

A KALEIDOSCOPE OF COLOUR

SAMCO will soon be releasing a new add-on for the SAM Coupe. Called Kaleidoscope, it is designed to give a vastly increased palette of colours. By adding extra degrees of control to the red, green and blue intensity the system can produce over 32000 colours.

Kaleidoscope will be available by the end of the month. For more details ring SAMCO on 0792-700300.

TRILEX EXTRA

FRED Software have released a disc with 25 extra levels for their TRILEX game sold on the IMPATIENCE disc. Priced at £9.99 it offers several new features as well as the extra levels.

News Credits: B. Earp, Ken Elston.



Greetings from sunny Gloucester, well it is quite sunny as I write this - Easter is here - so summer is just round the corner.

There are two birthdays to celebrate this month. First, the 10th Birthday of Britain's biggest selling home computer - the ZX Spectrum. It was May 1982 when Uncle Clive launched his new baby at Earle Court. It was to be several months before machines actually started arriving in peoples homes but the revolution was under way.

The Spectrum may not have been around quite as long as our front cover seems to show, but it has had as much effect on computerkind as another black monolith did on our Homo Erectus ancestors. In the September issue we are planning to run articles tracing the history of the Spectrum and its software. If you have anything you would like to contribute I would like to hear from you as soon as possible. Articles, letters, just a few words. How did you start with the Spectrum? How has it changed your life? What do you do with your Spectrum? Come on, tell us, the best story could win you a special prize.

Next, and just as important, this month also marks the 5th anniversary of the founding of INDUG. May 1987 saw us starting out at the ZX Microfair in London. Promising to support the DISCIPLE interface, then just six months old, I thought I might find a few kindred souls who enjoyed dabbling with the Spectrum. Now, 3500 members later, my original DISCIPLES are still going strong and so is INDUG. Watch out next month for news of how INDUG is going to grow in the future - we

are already the biggest, but we are going to get bigger still. One question though, "How did people manage for FIVE WHOLE YEARS before INDUG came along?"

The SAM Coupé will soon be available in a new package deal. After a lot of research I have persuaded SAMCO to relaunch the 256K tape based SAM. There exists a large potential market for SAM among existing Spectrum games players. The ability of SAM to run the vast majority of 48K games makes the Coupé the logical replacement for an ailing Spectrum. Sinclair after all built his entire empire by selling machines that you could buy 'a bit at a time'. In fact it was only when he launched his first 'its all in one box' machine (the QL) that things started to go wrong for him.

The new SAM 'GAMES-STAR' pack, priced at £99.99, will also pitch well against the Video Games Consoles. Would you rather have a real computer, with software that will run on it available for as little as \$1.99. Or would you buy a consol for around the same price and pay £20-£30 for each game (or even more).

One last thing. Last month I told you Nev had sent me his Help Page on an IBM disc. I said I knew it was an IBM disc as soon as I opened the envelope - there was no label, so how did I know? Well the answer is quite simple, IBM discs format at 720K as they only have 9 sectors to the track instead of the 10 sectors we are used to on the Spectrum and SAM. So you see, with 160 less sectors, the disc was lighter than his normal discs....

Bob Branchley, Editor.

S.D. Software



SPECIALISED IBM-DOS PC-SUITE

SPECMAKER The simplest Spectrum emulator for your SAM 1000s of 48K programs work without the need for any conversion. Most other programs need only minor changes. All the extra SAM keys work in Spectrum mode. Uses SAM's parallel printer port and up to 360K of SAM memory as a RAMDISK. PLUS D and all OPUS disks* can be loaded into SPECMAKER and saved to SAM disk. Can now convert files between Messenger & SPECMAKER format and so save on valuable disk space. Supplied on 3.5" disk *Master Dos & Master basic required for single density OPUS

PC-Suite From the author of SPECMAKER S.D. Software brings you PC-SUITE. Now you can transfer your IBM data files by reading and writing IBM disks on your Sam. PC-Suite will let you format IBM disks on Sam. Write Sam basic programs on your PC.AT. Use PC-Suite to copy Sam data files to PC disk and print them on a high quality laser printer. Many more uses.

nb. Not a PC emulator.

UNIDOS Version 2 of the incredible new DOS from Steve Warr for the PLUS D and DISCIPLÉ. Same DOS file for both systems. Random files. Sub directories. Hundreds of files on one disk. Hidden files. Protected files. Copy files of any length. Incredibly versatile screen dump routines. Error trapping. Many more features. Compatible with all Spectrums. Over 20 programs now included on the disk. * +2A/+3 restricted to 48K mode.

SPECFILE+ Now a Spectrum data filing program that never gets out of date. Specfile+ holds a massive 28K of data and by using data compression makes it seem like much more. Very fast CASE selective and complex searches. Designed to be added to so it grows as you do. This program is a must have for any one with data to hold.

INDUG PRICES

	MEMBERS	NON MEMBERS
Specfile+	£ 9.95	£12.95
UNIDOS	£19.95	£25.95
Createfile Manual	£ 5.50	£ 6.50
Specmaker	£ 9.95	£12.95
Specmaker Upgrade	£ 6.50	£ 8.00
PC Suite	£19.95	£25.95
IBU* /SAMIBU	£ 3.50	£ 4.90
DBU*	£ 4.00	£ 5.50
File Converter*	£ 4.50	£ 5.30
Hackers Workbench*	£ 8.50	£ 9.90

* GDOS programs still available *

PLEASE Add £0.50 Postage
(£1.20 OUTSIDE UK)

DO NOT FORGET YOUR INDUG
MEMBERSHIP NUMBER

Don't forget to say if ordering for PLUS D or DISCIPLÉ and the size of disk required. (PLUS D, 3.5 inch BOT will be sent otherwise)

S.D. Software, 70 Rainhill Road, Barnoldswick, Lancashire, England, BB9 6AB.

SHORT SPOT

Edited By:- John Wase.

As many of you know, I write for other magazines, including Micro Computer Mart. An article that I recently submitted entitled "A Day at Elonex", or something similar conceals a monumental tragedy. My nice little portable SX386 died, after receiving a huge mains spike in the Biochemical Engineering Building at work. Even though it was plugged into a so-called "filtered plug". Although Elonex revived it, double quick, I rapidly decided that I was not going to take it back to work until I had done something to ensure that tragedy did not strike again. After all, it took time and it cost me to go to London. Even more time to replace all the programs on the hard disc. And even longer to get them all working like they used to. As expensive little portables are not the only things to suffer in this way, I thought you might like the results of my investigations.

I'm no great shakes at electronics, but my understanding is that a filtered plug merely contains a dirty great capacitor. If the spike is bigger than the capacitor can take; tough. On your computer, that is. The best form of protection is an uninterruptible power supply. A UPS essentially uses a transformer to charge a battery from which your computer runs. It has two over-riding disadvantages: the huge battery is incredibly heavy, and the most modest one costs between £200 and £300. For my purposes, the cost was too much and the weight made it impossible for my applications. What other alternatives are there?

One of the possibilities was demonstrated to me at the recent "Which" show. It's a plug which contains (I think) a little choke, and solid state circuitry which smooths

out current spikes. Chops off the top and lets this go to earth. It also deals with voltage surges and radio-frequency interference. What it won't do is help you if the current is cut off: a complete black out. It won't help in a "brown out" (a momentary drop in current or voltage), either. These could well lose programs or data. They might in extreme cases damage a hard disc if a read or write is in progress, though this is very unlikely. But they won't give the guts of your machine amnesia, like mine got. It cost £23.80 which is reasonable. If you've got mains problems with your SAM or Spectrum, it could be worth considering. As a cheaper alternative, I got myself a four-socket extension cable, which guards against the worst excesses (I guess we're back to the capacitor), for home, for a mere £16.00. These came from Bowthorpe EMP Ltd, Stevenson Rd, Brighton, BN2 2DF. 0273 692591.

You've heard me talk of Etrick Thomson before. He mentions that he was reminded that Alan Cox's "Spiral Pictures" (Short Spot Feb 92) seems to be a simplified version of Peter Maurer's "Rose" algorithm. The disc program, listed below, is a SAM variant of a BetaBasic version produced by Etrick, together with G.Jackson. Run it; you get an asterisk when the pattern is complete. Press a key and you get another one! Magic. Here it is...

```

5 REM rose:algorithm by Peter Maurer:
  er:program by G Jackson & W E Thomson
10 LET k=PI/180,xos=128,yos=78
20 ■
30 LET n=RND(178)+1,d=RND(178)+1
40 IF n MOD 2 AND d MOD 8 THEN LET b=180: ELSE LET b=0
50 PRINT "N=";n"D=";d
60 PLOT 0,0

```

```

70 LET a=0
80 DO
90 LET a=(a+d) MOD 360,t=k*a,r=B7*B7
  IN ((a+d) MOD 360)
100 PEN RND*15: DRAW TO r*SIN t,r*CO
    S t
110 LOOP UNTIL a=b
120 PRINT "a": PAUSE
130 CLS
140 LOOP

```

Let's stay with SAM for a while. Over to James Horsfall of Uffington, Oxfordshire, who sends me a couple of variants on an idea for changing SAM's palette colours by striping or stippling. The first adds a few more colours to SAM's palette by striping the screen: POKEing 23112 with '(16 * first colour) + second colour', colours 0 - 15 that is, stripes the screen. Then palette changes are made randomly to the two colours chosen and which are printed out at the bottom of the screen. Press a key to move to the next colour combination. Keep doing this until the stripes are no longer visible and lo; you have a new colour. Make a note of the two numbers, and you can reproduce it whenever you want, unfortunately you cannot set it up on the border as well.

```

10 MODE 4: CLS#
20 POKE 23112,18: CLS
30 LET P1=RND(127), P2=RND(127): IF
  P1=P2 THEN GOTO 30: ELSE PALETT
  E 1, P1: PALETTE 2, P2: PRINT #1:
  P1, P2
40 PAUSE: CLS: GOTO 30

```

James' second offering is different from the first only in lines 20 and 40. It creates stripy writing. In contrast to the first application, here the more noticeable the stripes, the more effective the writing. As James says, try it and see!

```

10 MODE 4: CLS#
20 POKE 23112,18: CSIZE 8,16: LIST
30 LET P1=RND(127), P2=RND(127): IF
  P1=P2 THEN GOTO 30: ELSE PALET
  TE 1, P1: PALETTE 2, P2: PRINT #1
  ; P1, P2
40 PAUSE: CLS: GOTO 20

```

Many thanks, James.

Now over to the Spectrum, or rather Spectrums. Roy Burford of Norton, West Midlands, has written to mention that he has a nice little refinement to Bert Seymour's clock (Short Spot, March '92). The Frames timebase seems not to be entirely accurate and, at least on Roy's Spectrum, loses (maybe due to running it on a 128k Spectrum, Roy). As you can see from the listing, this program in Roy's collection was originally by Scott Watson, and has been modified for the TRS80-II before arriving at the Spectrum, so it has quite a venerable history. The way in which it displays the time is quite different from Bert's analogue clock, with a minimum of moving display. The program title, "Lineaclock", gives us a clue as to how it will look: the program itself contains a delay loop which will, at least, regulate for a slight gain. All you need do is alter the T0 value in line 180. Of course, if you give the computer a lot of screen shifting to do, the delay loop's range is reduced and adjustment of the timekeeping is coarsened. Try it and see.

```

1 REM Wm. Scott Watson. 67 Ready to
  Run Programs in Basic. TAB. 1981.
2 REM Revised to TRS-80-II and this
  form) B.C.R.Burford 100688.
3 REM Revised to ZX Spectrum 128K
  by B.C.R.B 020492.
9 PRINT " " An Expensive Timepiec
  e.": PRINT
10 PRINT "To set clock:--"
15 PRINT "Enter hour(0 to 23):- ";
20 INPUT h: PRINT h
25 IF h<0 OR h>23 THEN GOTO 15
27 PRINT "Enter minutes(0 to 59):-
  ";
30 INPUT m: PRINT m
35 IF m<0 OR m>59 THEN GOTO 27
37 PRINT "Enter seconds(0 to 59):-
  ";
40 INPUT s: PRINT s
45 IF s<0 OR s>59 THEN GOTO 37
60 PRINT "The clock will start at:-
  ..."
65 PRINT " " :h:" : ";m:" : ";
  s
67 PRINT "Press ENTER to start cloc
  k:--"
70 INPUT a$
80 CLS

```

```

85 PRINT AT 0,5;"An Expensive Timepie
  ce."
90 PRINT AT 5,0: INK 2:"000000000011
  11111112222"
100 PRINT AT 6,0: INK 2:"012345678901
  234567890123 hour"
110 PRINT AT 7,h:"!"
115 PRINT AT 9,0: INK 1:"000000000011
  111111122222222223>"
120 PRINT AT 10,0: INK 1:"01234567890
  12345678901234567890>"
125 PRINT AT 12,0: INK 1:"33333333344
  44444445555555555"
130 PRINT AT 13,0: INK 1:"12345678901
  234567890123456789 m"
135 IF m>30 THEN PRINT AT 14,m-31:"!"
  : GOTO 145
140 PRINT AT 11,m:"!"
145 PRINT AT 16,0: INK 3:"000000000011
  111111122222222223>"
150 PRINT AT 17,0: INK 3:"01234567890
  12345678901234567890>"
155 PRINT AT 19,0: INK 3:"33333333344
  44444445555555555"
160 PRINT AT 20,0: INK 3:"12345678901
  234567890123456789 s"
165 IF s>30 THEN PRINT AT 21,s-31:"!"
  : GOTO 180
170 PRINT AT 18,s:"!"
180 FOR n=0 TO 104: NEXT n
190 IF s>30 THEN PRINT AT 21,s-31:" "
  : GOTO 200
195 PRINT AT 18,s:" "
200 LET m=s+1
210 IF s>59 THEN GOTO 230
220 GOTO 165
230 LET s=0
235 IF m>30 THEN PRINT AT 14,m-31:" "
  : GOTO 250
240 PRINT AT 11,m:" "
250 LET m=m+1
260 IF m>59 THEN GOTO 290
265 IF m>30 THEN PRINT AT 14,m-31:"!"
  : GOTO 280
270 PRINT AT 11,m:"!"
280 GOTO 165
290 LET m=0
300 PRINT AT 7,h:" "
310 LET h=h+1
320 IF h>23 THEN GOTO 350
325 IF m>30 THEN PRINT AT 14,m-31:"!"
  : GOTO 340
330 PRINT AT 11,m:"!"
335 PRINT AT 7,h:"!"
340 GOTO 165
350 LET h=0
355 IF m>30 THEN PRINT AT 14,m-31:"!"
  : GOTO 370

```

```

360 PRINT AT 11,m:"!"
370 PRINT AT 7,h:"!"
380 GOTO 165

```

Roy also mentions that P.Berry's "circle" program in last month's FORMAT is unusual, but unfortunately crashes 128k machines as it has a machine code routine which is located in the printer buffer; fine for a 48k but lethal to the 128. Consequently he (Roy) has reassembled the code to run at the top of RAM. Here's the modified program...

```

1 REM Vol.5 - No 8. FORMAT. April 1
  992. Short Spot. p10.
2 REM Revised to ZX Spectrum 128K
  by B.C.R.Burford 110492.
5 REM CIRCLE PROGRAM by P.Berry
6 CLEAR 65294
7 PRINT #1:AT 0,0:"Use q for left,
  p for right:""Press BREAK to exit."
9 POKE 23658,0
10 FOR f=65295 TO 65295+72
20 READ a
30 POKE f,a
40 NEXT f
50 DEF FN c(x,y,r)=USR 65295
55 LET x=127
60 FOR r=1 TO 87 STEP 1.2
70 LET x=x+(INKEY$="p")-(INKEY$="q")
80 LET i=FN c(x,87,INT r)
90 NEXT r
95 GOTO 95
100 DATA 221,42,11,92,221,110,4,221,1
  02,12,221,70,20,14,0,80,203,58,21
  3,205,53,255,209,12,122,145,87,48
  ,4,122,128,87,5,120,185,48,237,20
  1,205,56,255,120,65,79,205,62,255
  ,120,237,68,71,125,129,212,74,255
  ,125,145,216,197,79,229,124,128,7
  1,254,176,220,223,34,225,193,201

```

Now for some of our newer readers... Just a few basic Basic tips which might help you to program more neatly. Nuisance, isn't it, when the Speccy suddenly stops with the message "Scroll?" when you least intended it. POKE 23692,255 will give you 254 screens before the message interrupts you again. Of course, all SAM users have to do is type "SCROLL CLEAR". Another feature of interest is a crash. This always happens when you least expect it. You've just typed in

2000 lines of Basic, and have just 3 to go before you save, when the keyboard locks and you cuss and the cat runs for cover and... You can make crashes happen deliberately, though. Here are some Spectrum ones for fun...

```
10 PRINT "JOHN JONES IS THE GREATEST"
20 PRINT USR 1000
```

The Spectrum will display your message, buzzing loudly, the border will turn black and the keyboard will be ignored. Perhaps a more colourful crash is produced by...

```
RANDOMIZE USR 5050
```

And if you have a nine pin Epson FX80 compatible attached, try...

```
RANDOMIZE USR 600
```

Finally, for a quick explosion rather than a crash, try...

```
RANDOMIZE USR 1300
```

Now back to SAM with this note from Alan Cox of St Clears, Dyfed. He felt extremely pleased with himself after this little programming job. The problem was to set up 26 string variables (a\$ to z\$) and then to give them "anonymous" initial values (LET a\$="a", b\$="b", etc). Essentially, the program is that dangerous beast, self-modifying code. As it runs, the Basic modifies itself by POKEing successive ASCII letter-codes into the LET line.

```
10 LET n=97
20 LET a$= CHR$(n)
30 LET z=DPEEK 23200 + 16384 * (PEEK
  K 23199 - 1)
40 POKE (z+21),n+1
50 LET nLn+1
60 IF n>123 THEN GOTO 20
70 POKE (z+21),97
```

For this, Alan uses PROG in line 20 and then counts forwards. It would be better, in general, to use NXTLIN and to combine lines 30 and 40 into a single line that goes before the line you want to vary. Although, as written, it's clearly a SAM program,

it would easily translate into Spectrum Basic.

Tony Jeenes of Malvern, Worcs, has written in to mention that 40 years spent in the RAF has made him try to keep things tidy. One of the more ragged things is a list of DATA statements in decimal format. It makes for difficult reading, especially when a decimal is split over the end of a line. SAM has this super KEYIN facility: let's use it. So he wrote a short routine to change the data to HEX form and create new lines, starting at a pre-determined line well clear of any existing Basic, and splitting it up into 8 Hex bytes per line. As an example, he used the data from P.Berry's "circle" program. Poor Mr Berry; someone else mauling your efforts, now. The thing is, if you look at page 10 of April's FORMAT, Mr Berry's DATA list shows the very point that Tony is making. First, type in the main program and save it. Here it is

```
1 LET Z=1,F=2000,M=1
2 FOR S=1 TO 10: DIM B$(16)
3 FOR A=N TO N+7
4 READ C: LET B$(Z TO Z+1)=HEX$(C
  T BYTE OF DATA
5 IF A>=73 THEN GOTO 7: REM 73=LAS
  T BYTE OF DATA
6 LET Z=Z+2: NEXT A
7 LET FS=STR$(F),DS="DATA "
8 KEYIN FS+DS+CHR$(34)+BS+CHR$(34):
  LET N=N+8,F=F+10,Z=1
9 NEXT S
10 STOP
```

Now let's add Mr Berry's data list. You can merge in any old data list here, of course.

```
20 REM F=START No.OF KEYIN LINES IN
  C. BY 10 IN LINE 8
30 REM S=No.OF LINES TO KEYIN
40 REM 73=No.OF BYTES IN DATA
100 DATA 221,42,11,92,221,110,4,221,
  102,12,221,70,20,14,0,80,203,58,
  213,205,38,91,209,12,122,145,87,
  46,4,122,128,87,5,120,185,48,237,
  ,201,205,41,91,120,65,79,205,47,
  91,120,237,68,71,125,129,212,59,
  91,125,145,216,197,79,229,124,12
  8,71,254,176,220,223,34,225,193,
  201
200 SAVE "auto.KEYIN" LINE 210
```

```
210 POKE SVAR 618,8
220 LIST
```

Now run the program. You get a neat data list that's much easier to type in. The extra spaces in line 2090 are easily deleted, if necessary. Here it is...

```
2000 DATA "DD2A0B5CDD6E040D"
2010 DATA "660CDD46140E0050"
2020 DATA "CB3AD5CD265BD10C"
2030 DATA "7A915730047A8057"
2040 DATA "0578B930EDC9CD29"
2050 DATA "5B78414FCD2F5B78"
2060 DATA "ED44477D81D43B5B"
2070 DATA "7D91D8C54FE57C80"
2080 DATA "47FEB0CDF22E1C1"
2090 DATA "C9"
```

Only one problem left. You need a new "READ" routine to read the Hex:-

```
10 LET F=23296: FOR S=1 TO 10
20 LET N=1: READ A$: LET L=LEN A$
30 LET B=VAL("&"+"A$(N TO N+1)): REM
  CONVERT TO DECIMAL
40 POKE F,B: LET F=F+1
50 LET N=N+2: IF N<L THEN GOTO 30
60 NEXT S
```

Tony also mentions that it would be much easier to include a "sumcheck" routine: a decimal number at the end of each line so that any error can be narrowed down to that one line. And that's it. Cheers, Tony.

Peter Williamson of Sleaford, Lincs, has written in, sending a nice little SAM program for those of you who are sufficiently well off to have a bank balance. He has recently written a program to check bank statements against cheque book/card transactions. Of course, every entry in the bank statement should have an equivalent transaction record. By checking one against the other, it's easy to find that odd withdrawal from a cash point late one Sunday night that one forgot to record...

This is done with a string array I\$(X,20) to hold information on each item on the bank statement and a corresponding string array JS(Y,20) for the transaction information. In

the case of cheques, it's the cheque number. Two other arrays: A\$(X,8) and BS(Y,8) hold the amounts on the bank statement and cheque book/cashpoint counterfoils respectively. Cheque amounts (out), are entered as negative; receipts (in) as positive. This means it's easy to get the total number of lines necessary using VAL A\$(X) etc.

Here's the non-correlation routine. After entering the start line (SL) and the finish line (FL) of the section to be checked;

```
2700 LET N=FL-SL+1
2710 DIM M(N): DIMN(N)
2720 FOR W=SL TO FL
2730 FOR Z=SL TO FL
2740 IF I$(Z)=JS(W) AND A$(Z)=BS(W) TH
  EN LET M(Z)=1,N(W)=1
2750 NEXT Z
2760 NEXT W
2770
2780 FOR Z=SL TO FL
2790 IF M(Z)=0 THEN PRINT D$(Z): TAB 1
  0: I$(Z): TAB 35: A$(Z): TAB 43:
  ":"
2800 IF N(Z)=0 THEN PRINT TAB 43:"":
  TAB 45: ES(Z): TAB 55: JS(Z): TAB
  78: BS(Z)
2810 NEXT Z
```

The arrays D\$(Z) and ES(Z) hold the dates of entry of the items. These do not enter into the non-correlation routine. The TAB 43:"" just divides the display into left hand side, bank statement items; right hand side, cheque book dispenser items.

In operation, items in the bank statement array that match items in the cheque book array set the flag arrays M() and N() to 1, whilst the unmatched items have their flags still at 0. Only items with flags at 0 are printed out. The display runs in Mode 3. Now we can all keep our financial affairs in order!

And that's really all I've got for you this month. I'm sure you have some favourite routine which you could send me. Come on; send them to: John Wase, Green Leys Cottage, Bishampton, Pershore, Worcs. WR10 2LX.

HILTON COMPUTER SERVICES presents

a Jack Gibbons program ...

the Personal Banking System

Now showing on a SAM Coupe near you - don't miss it!

The Personal Banking System assists you in keeping track of your finances, spanning all Bank, Building Society and Credit Card accounts; avoiding expensive overdraft letters and bounced cheque charges, because you will always know where you stand.

Here are just some of the facilities available:-

- o automatic posting of standing orders & direct debits for any frequency and for a set number of payments
- o extensive, flexible enquiries eg how much have you paid to the supermarket each month or how much to run your car
- o forward projections to enable you to plan how much money you have left to live on
- o detailed Bank statements, more up-to-date than the ones from your Bank, etc - password controlled
- o on-screen limit monitoring so you know immediately if you are going into the red
- o Bank reconciliation so you can check the statement received from your Bank and see where they have gone wrong
- o suitable for private, club or small business (even handles Hilton's accounts) - optional VAT facility
- o optional categories for analysis, account and general ledger codes with on-screen lookup feature
- o on-screen help, supplemented by friendly 75 page user manual
- o optional modules available eg Final Accounts and Budget
- o trade in allowance available should you later buy a different make of computer - upgrade benefits

The PBS requires SAMDOS or MasterDOS, 256K or 512K RAM and 1 or 2 disk drives. Full after sale support provided.

Similar versions are available for other computers eg CPC, QL, PC and planned for Amiga and Atari ST.

PBS I is still available for the Spectrum (all models) on cassette, microdrive, PlusD/Disciple and Opus for just £12.

Stop Press ...PBS Budget module is now available - £12.95. Do you have the latest copy of the PBS (version 2.06)? If not then send original disk, plus stamp, for free, updated copy.

Send just £19.95 for PBS disk and 75 page user manual to:-

Hilton Computer Services Ltd
3 Suffolk Drive, Guildford,
Surrey, GU4 7FD (0483 578983)



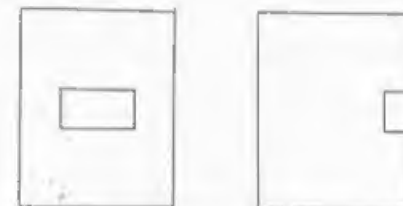
THOUGHT SPOT.

By:- Jeremy Cook.

Hello and welcome. On today's menu are a few puzzles for starters, the solution to the hanoi problem is the main course (long overdue, sorry) and we finish with the answers to last month's puzzles. So, mental knives and forks at the ready...

VIEW TO A?

The diagram shows the front view and a side view of a building. What would this building look like if it were built?



PRIZE PUZZLE RESULT Towers of Hanoi

This has been the most entered prize puzzle so far, with seventeen people having sent in their solutions. Entries I eliminated early on came from John Gaisow; Michael Carley; Allen Vernon and Juan Guillen. Unfortunately their programs either had the moves in DATA statements or were "hard-wired"; that is the programs were not working out the moves. This is a shame because Allen's program had a good display and a facility for trying to solve it manually.

Cutting the list down further was a bit more tricky. I first split them into two groups: nine recursive and four non-recursive. Eight of the recursive ones were basically the same. The non-recursive ones were based on observation of patterns in the moves.

David Wood's program thinks of the discs as numbered from 1 to 5 (as do most of the entries). It finds the smallest movable disc not moved the previous go, and decides whether it has an even or odd number. Then it

KEEP IN TOUCH

Take six pencils. Now arrange them so that each of them is touching all the others. Now do it with seven!

TRIANGULATION

The problem is to find all the right angled triangles with all sides having integer length, given the length, say a , of one of the non hypotenuse sides. If you haven't already guessed, a small program is required (this is not a prize puzzle). Sounds easy? Well it's got to cope up to at least $a=2000$. Why should you bother? Spiritual fulfillment, of course! Hint: Pythagoras' Theorem might be useful. (This little poser has a slight mathematical flavour, which will not be to everybody's taste. I include it because it looks simple, but there are a few traps. G.Jackson, who sent me this problem, wrote a program on his Spectrum that found the 24 triangles for $a=2000$ in just under 1.5 minutes. Beat that!)

ANIMALGRAMS

Animalgrams are anagrams of animals' names. Below are several such words. Some of the animals are not so well known (and may not even exist!). How many can you get? (mostly taken from "Puzzles and Teasers for Everyone")

PEA	LADEN	BARGED	GUN
BRAZE	LOOPED	ALES	BALES
PELTER	COAT	EVICT	PAROLED
POINT	GROAN	MARTIAN	DOING

tries to place the disc on the first available disc of opposite parity. If this is not possible, the disc is placed on the first available disc of the same parity. Davids program only does five discs, but any number could be coped with by making an appropriate first move depending on odd or even number of discs.

Sander van der Berg, D.A.Lorner and Antonio Protopapa used similar ideas. Mr Lorner and Antonio both use the fact that the discs "rotate" through the pegs at set intervals. For example, the smallest (top) disc is moved every other move, and repeatedly goes from peg 1 to 3, 3 to 2, 2 to 1 (ie. rotating anticlockwise) for odd numbers of discs (clockwise for even numbers of discs: 1-2, 2-3, 3-1). The direction of rotation alternates down the tower, and the step between moves doubles. Sander's program is almost of this nature, but not quite, which is possibly the reason why it doesn't cope with even numbers of discs in the minimum number of moves. Incidentally, if you have n discs, the minimum number of moves is $2^n - 1$.

The recursive programs were all for the SAM Coupé, though Ettrick Thomson deliberately wrote his without using any of SAM's extras. Although I have included Matthew Collins' program in this group, I don't think it is recursive, but it's very close. It is, however, basically similar to Ettrick's program. Matthew provided two versions of his program, one with a simple display, the other with nicely shaded golden discs. A good idea since I could both see the graphics and an uncluttered program.

Peter Hutchison also sent in two programs, but his non-recursive attempt took a large number of moves. The other entries were from Tim Wells, Daniel Cannon, Christian Kandt, and Martin Rookyard. Thanks also to Nigel French and M.Fellows for their contributions.

All the recursive programs (bar one) have a procedure (or subroutine) that fits this basic pattern:-

```
DEF PROC hanoi n, from, to
  LET spare = 6 - from - to
  IF n=1
    THEN movedisc 1, from, to
  ELSE hanoi n-1, from, spare
      movedisc n, from, to
      hanoi n-1, spare, to
  END PROC
```

The procedure movedisc is a display routine showing the movement of disc 'n' from peg 'from' to peg 'to'. The variable 'spare' can be one of the parameters, or calculated as above. The procedure hanoi effectively takes the first $n-1$ discs on peg 'from' and pionsks them on peg 'spare'. Then it moves the last disc on 'from' to 'to'. Then it removes the $n-1$ discs on 'spare' to 'to'. If you don't understand this, never mind. Instead of trying to explain recursion in the small space available here, I have written a separate article that I hope the editor will publish for you.

If you've been counting you will realise that I haven't mentioned one of the entries yet. This was from Ingo Wesenack, and is the winner. This program was noticeable because it allows variable numbers of pegs as well as discs. It has a simple display (similar to Ettrick's), which easily copes with many discs and pegs. I don't know if it takes the minimum number of moves, but I can't do better. Well done Ingo, claim your years subscription next time you renew.

```
10 REM Tower of Hanoi
20 REM Ingo Wesenack
40 DEF PROC Draw_peg no
50 PRINT AT no+2,6;peg$(no)
60 PAUSE 30
70 END PROC
80 DEF FN Name$(d)=CHR$(48+d+(7 AND d-9))
90 DEF PROC Move_disc size,from,ther
e
100 REM cut off last element of peg$(
from)
110 LET peg$(from,LEN TRUNC$ peg$(fr
om))=" "
120 Draw_peg from
130 REM add disc(size) to peg$(there)
140 LET peg$(there)=TRUNC$ peg$(there
```

```
)+FN Name$(size)
150 Draw_peg there
160 END PROC
170 REM set a to next peg left to a,
but not b or c
180 DEF PROC Next_peg REF a, b,c
190 DEF FN Left_peg(a)=a-1+(pegs AND
a=1)
200 DO
210 LET a=FN Left_peg(a)
220 LOOP UNTIL a<>b AND a<>c
230 END PROC
240 DEF PROC Release_disc size,from,t
here,free_pegs
250 REM release disc(size) at peg(fr
om) and move it to peg(there)
260 LOCAL p
270 IF size>1
280 REM remove discs at peg(from) abo
ve disc(size) up to disc(2), till
only one unused peg will remain;
move remaining discs as tower on
to this last unused peg
290 LET p=there
300 Next_peg p, from,there
310 IF free_pegs>1
320 Release_disc size-1,from,p,free_p
egs-1
330 ELSE
340 Move_tower size-1,from,p
350 END IF
360 END IF
370 Move_disc size,from,there
380 END PROC
390 DEF PROC Pile_up size,b,from,ther
e,used_pegs
400 REM pile up discs(size)-(1), col
lecting them from all pegs beside
pegs(b)and(there)
410 LOCAL p
420 IF size>1
430 LET p=from
440 Next_peg p, b,there
450 IF used_pegs>1
460 Move_disc size,p,there
470 Pile_up size-1,b,p,there,used_peg
s-1
480 ELSE
490 REM if only one peg remains there
could be a tower on it
500 Move_tower size,p,there
510 END IF
520 END IF
530 END PROC
540 DEF PROC Move_tower size,from,the
re
550 Release_disc size,from,there,pegs
-2
560 Pile_up size-1,from,there,there,p
egs-2
570 END PROC
580 REM Main program
590 CLS
600 PRINT TAB 9;"Tower of Hanoi"
610 INPUT "How many DISCS do you want
? ";discs
620 INPUT "How many PEGS do you want?
";pegs
630 DIM peg$(pegs,discs)
640 FOR i=1 TO discs: LET peg$(1,disc
s)=1-1)=FN Name$(1): NEXT i
650 FOR i=1 TO pegs: PRINT AT i+2,0;"
peg ";i;" --": NEXT i
660 PRINT "Press any key to speed up
"
670 Draw_peg 1
680 Move_tower discs,1,pegs

That's all for this month. Thank you
for your support. I hope you'll join
me again next month. I am always happy
to receive comments or puzzles, so if
you have anything to say, send it to
the usual address. Cheerio.

```

SOLUTIONS TO APRIL'S PUZZLES

Figure It Out:-

8	7	2	4	2	5
2	3	4	5	6	7
6	1	6	9	3	1
8	9	8	7	1	9
6	4	2	3	4	8
3	1	5	9	5	7

Under Attack:- Here is the best I can do. If you can do better then let me know. The first number is the minimum number of pieces needed. When the other eight numbers are in binary (use 8-digits), the 1's refer to where the pieces may be placed for a solution (there's usually more than one).

i)	28	66,90,66,90,66,90,66,255
ii)	12	0,32,54,4,32,108,4,0
iii)	8	0,0,0,170,170,0,0,0
iv)	8	1,2,4,8,16,32,64,128
v)	5	4,2,1,0,0,0,128,64
vi)	9	0,146,0,0,146,0,0,146

Languages:- Maltese, French, Bengali, Cantonese, Swahili, Turkish, Dutch, Burmese, Greek, Icelandic, Afrikaans, Urdu, Gaelic, Walloon, Flemish, Tagalog.

1984:- 1857024 / 936 = 1984

SAM COUPE II
AND
SPECTRUM
DRIVE
MAGAZINE!

OUTLET!

REGULAR
MONTHLY
SOFTWARE
SINCE
1987!

Programs, utilities, graphics, info, ideas, news, reviews, readers' letters, machine code and BASIC programming help, games, puzzles and every variety of interesting software!

OUTLET is available on all popular systems; STATE WHICH...

SAM, DISCIPLE/+D, +3, OPUS, TAPE

SPECIAL OFFER: Latest issue only £2.50 to newcomers!

* OUTLET is friendly! -load/exit with a keypress from and to a CONTENTS page or the 'next item' so you can browse!!
* Print articles in 3-column, newspaper-style or just one page. * Page back/forth or enter page number. * Graphics
* Music * Comms * Text adventures * Programming toolkits!
* Every kind of interest!! * Hundreds of problems solved!

OUTWRITE!

SAM COUPE WORD PROCESSOR
Smooth, machine code action:
Excellent key response: Lots
of features including: Block
functions: Wordwrap, Justify:
Rapid reform of paragraphs:
Printer codes: Loads Tasword
files: Forward/back DELETE:
Push left/right/centre: Tab:
Paging: Fast cursoring: Word
count: Any screen colours of
your choice: User-friendly,
etc. etc.. Special discount
price to OUTLET readers: £12

The STYLE WRITER

SAM COUPE WORD PROCESSOR
Both graphics and text may
be included in a document:
Colour printers supported:
Numerous printable fonts!
Block functions: Wordwrap:
Justify: Reform paragraphs:
Load Tasword files: Push to
left/right/centre: Paging:
Tabs: Any screen colours :
Search and Replace: So many
features - NEEDS MASTERDOS
AND 512K SAM! :Font editor:
Disc full of extras! £9.50

Chezron Software, 605 Loughborough Road, Birstall, Leicester, LE4 4NJ

NEV'S

HELP

PAGE

By:- Nev Young.

I have to admit that I am not the type of person who plays games on the computer. I won't say that I never do, but hardly ever. Over the years I have come into possession of quite a number of games, usually when buying another machine. Most of these are still in the boxes and have never been used by me. So what has all this got to do with the help page? I have received several queries about one particular game that I do have but have never played, this is 'The Lords of Midnight'. So I have eventually bowed to pressure and I took it out of the box and loaded it. I knew, from reading FORMAT, that I needed to disable the PLUS D printer port to get it to load so it loaded first time and started to run. What's the problem I thought it works, but when night fell (I didn't know what that meant either) the game locked up and dawn never came. I am sure all the avid games players are now eager to learn how to get over this problem. Well I don't have one. I've not got a clue, and since its only a game I don't really care. But I would like to bet that somebody out there will now rise to the challenge and write back to me to let everyone else know how to make it work. Not only on the Spectrum with GDOS but also with Uni-Dos, and the SAM using one of the Spectrum emulators. As for me I've no time to play games I have to write the Help Page.

A question from Mr Jess about GM CALC for the SAM raises a point about many SAM programs and has far reaching consequences for anybody writing for the machine. His problem is that sometimes the program will, and sometimes the program won't print past column 63 in mode 3.

There are a number of system variable on the Coupé that do not get

initialized when a program is RUN or LOADED. The effect is that if you use one program that sets one of these variable to a value that is different from the normal switch on value then some other program may no longer work as it has assumed the switch on value for that variable. This is further complicated by the fact that variables do not get initialised when a program is LOADED that auto runs. For example:-

```
10 PLOT 0,0
20 DRAW 100,100
30 SAVE OVER "D1:JUNK" LINE 10
```

Seems simple enough. Type the program in and run it. It will save itself to the disc after drawing a diagonal line. Now type load "D1:JUNK" it will load and run and save once more. Now type MODE 3 as a direct command and then LOAD "D1:JUNK". It still loads and runs but the line is now at a different slope. RUN the program and the slope changes again. Type MODE 4 and LOAD "D1:JUNK" and then RUN and once more the slope changes.

There are quite a number of things that you must not take for granted with the SAM. A list of them follows along with ways of making sure you start from a known position. Although the list is not comprehensive.

Open screens

```
SCREEN 1: DISPLAY 1: FOR N=2 TO 8: C  
LOSE SCREEN: NEXT N
```

RANTOP

Set by using the CLEAR command.

Memory pages

Set by using the OPEN TO command

Channels

```
FOR N=4 TO 16: CLOSE #N: NEXT N
```

CLOSE #3: OPEN #3,"P"

Palette colours
PALETTE

XRG,YRG
in mode 1,2 & 4 LET XRG=256,YRG=192
in mode 3 LET XRG=512,YRG=192

XOS,YOS
LET XOS=0,YOS=0

RECORD
RECORD STOP

Character size
mode 1,2 & 4 CSIZE 8,9
mode 3 CSIZE 6,9

I am sure there are more, if you want to make sure that the machine is in a known state then switch it off and back on. Or you could write a program that will set things the way you like them, and call it "autoload" on your system disc. You could then also reload it any time you wanted to get back to that known state.

Ah another game query. This time about 'Return of the Witchlord' (how do they think them up) Karl Pridmore is having the problem that it crashes after a while. Assuming its not the usual dirty connectors then can anybody help him?

Now here is a problem I've not heard for a long time but it did used to be a common question. (I can remember reading the answer several times in Newsoms Helpline in a rival mag that I stopped getting when Andy stopped writing for it.) The problem is to do with the storage of floating point numbers and the errors that can occur when using them. In the case specified $0.22 + 0.1$ does not = 0.32 .

Lets go back a bit to first principles. The computer works in binary and so only holds the numbers 0 or 1. Each binary digit takes up one BIT of memory (and that, by the way, is where the word BIT comes from Binary digit). On the Spectrum and SAM numbers are held in a 5 byte form where 31 BITS are used to store the

number. The other BITS are used for adjusting the position of the binary point (like a decimal point but in binary) and holding the sign of the number. Mathematicians will know these as exponent and mantissa. So if we can build a conversion table from decimal to binary as follows:-

Decimal	Binary
8	1000
4	0100
2	0010
1	0001
0.5	0000.1
0.25	0000.01
0.125	0000.001
0.0625	0000.0001
0.03125	0000.00001
0.015625	0000.000001
and so on	

So if we take the decimal number 10 it is $8 + 2$ and in binary that is $1000 + 0010$ giving 1010 . But what of the number 0.1 I won't bore you with the details, but in binary it is $0.00011001100110011001100110011001100110011001100$ etc. As only 31 BITS are available the whole number cannot be held. The same is true of 0.22 which is approximately $0.001100001010001111010111000010100111$. It is because of the BITS at the end of the numbers that cannot be stored that the number actually end up slightly smaller than expected and when you add these slightly small numbers the error is compounded.

The reason you tend not to see these errors is that the routine for printing numbers will round them back up to 8 significant decimal digits, so the error is hidden when you print, but the stored number does have the error.

If you are interested I have a little program that will print any decimal number in binary but it goes wrong 31 BITS after the first "1" is printed. But now you know why.

```
10 INPUT "TARGET NUMBER (LESS THAN 0
    .5) ":T
20 LET R = 0
30 LET X = 0.5
```

```
40 LET XS="0."
50 IF R>X THEN LET QS="0"
60 IF R<X THEN LET QS="1": LET R=
    R-X
70 LET X=X/2
80 LET XS=XS+QS
90 IF LEN XS> 60 THEN PRINT R'XS:GOT
    O 10
100 GOTO 50
```

And finally yet another cry for help. Martyn Bader has got hold of an OKI Microline 192 (a wonderful little printer) but needs a manual to let him know the control code sequences. Can anybody help him. My own suggestion would be write to OKI Castle Cary Road, Wardpark North, Cumbernauld, Glasgow. (I only know that because I used to live in Cumbernauld. In fact I used to work in that very building until UNISYS shut it and made us all redundant!)

And even more finally two people have actually managed to find an error in the Uni-Dos SetUp program. On line 625 change POKE @90 to POKE @89 and on line 638 change LET DISP=90 to LET DISP=89. This has been corrected on all future discs. This causes the screen dumps not to work in some cases. I never had the problem as my printer is smart enough to handle two ESC characters at the start of an ESC sequence. I am rather surprised that out of over 1000 copies sold nobody found that one before. If anyone knows of any other errors in Uni-Dos please let me know. Otherwise it can't get fixed.

If you have any problems with your social life or with a computer than write to:-
Nev Young,
FORMAT Help Page,
70, Rainhall Road,
Barnoldswick,
Colne,
Lancashire,
England,
BB8 6AB.

Remember to enclose as many details as you can so I have a fair chance of coming to your aid.

Until you next month.

* * SMALL ADS * *

FOR SALE: Sound Machine £7, The Messenger £14, MasterDOS & SAM DOS £7, SC-Filer £5, GM-Base £5. All with manuals. Contact P.Cochrane, 2 Glensdale Street, Leeds, LS9 9JJ.

INPUT Magazines - complete bound set (4 volumes) excellent condition. £20. Phone G.Yeardley on Cambridge (0223) 841946.

WANTED DISCIPLE interface. Please ring Peter Page on 0603 713759 or write to 3 Stocks Lane, Blofield, Norwich, NR13 4JY.

FOR SALE SAM Coupé 512K, 2 drives, external drive/printer interface, manuals and various software, £195 or best offer. FM Meek, 18 rue de Schoenberg, L-8283 Kehlen, Luxembourg. Tel. 352-30.98.24

FOR SALE for PLUS D on 3.5" disc. DISC-MANAGER V3, PLUS D Hacker Toolkit/Filer and File Master. £5 the lot. Contact Rob on 0455 840828 between 6pm and 8pm.

HELP! If there is any Spectrum / PLUS D / DISCIPLE users in Swindon, who would like to share their knowledge with me, then please contact Clive on Swindon 530802.

YOUR ADVERT

Selling, Buying, Pen Friends, etc.

Any **PRIVATE** advert, up to 30 words (subject to acceptance), will be printed **FREE** in the next available issue. Any software sold must be original, in working order and with full instructions. The publishers will not be held, in any way, responsible for adverts in this column. Trade advertisers contact the publisher for rates.

PLEASE NOTE:- Due to limited space we can't guarantee your advert will appear in a particular issue. If your advert remains unpublished after two issues please send it in again.

HACKER'S CORNER

By:- Mark Lambert.

Last month I went over the basics of converting a multiloader to disc, now you get to see an example. Don't worry if you haven't got this game, it should still help to clarify the technique.

WONDERBOY

The first thing I needed was a working copy on disc, so I booted my PLUS D loaded the game and snapshotted it immediately to disc. I renamed this snapshot as "Wonderboy0", and as it stood it would load levels from tape.

I needed to find the part of the game that loads the levels from the tape, so I selected a one-player game and started the loading. When the border began to flash red and cyan waiting for the loader, I re-snapPped the game and entered the snapshot hacker

The stack holds all the addresses to return from CALLs, so one of them must be where to go after loading. The stack held the addresses 35291, 35046, 36201, 34070... and I started disassembling from 50 bytes prior to each, looking for the use of IX and DE and the call to the loader. I found this:-

```
35279 KOR A
35280 LD IX,24256
35284 LD DE,17
35287 SCF
35288 CALL 35233
```

This code loads 17 bytes at 24256 with flag byte 0, using a loading routine at 35233. This could be a standard Spectrum header.

```
35291 DI
35292 JP NC,35542
```

The JP NC is to cope with loading

errors, and so I needn't worry about it - I only need to know what happens when the loading works.

```
35295 LD A,(24262)
35298 SUB 49
35300 LD B,A
35301 LD A,(33353)
35304 CP B
35305 JR Z,35331
```

This compares the sixth byte of the filename (if it is a standard header) minus the ASCII code of '1' with the contents of 33353. If it matches then jump to 35331. This must be the code to check that the correct level is loaded. The code for coping with the wrong level being found is not important, because the disc always supplies the file we ask for, so jump to -

```
35331 CALL 35491
```

I disassembled this subroutine, but found only LDIR type instructions, none of them did anything with the 17 bytes just loaded

```
35334 LD HL,35644
35337 CALL 35412
```

This routine had no references to the 17 bytes either.

```
35340 SCF
35341 LD DE,(24267)
35345 SBC A,A
35346 LD IX,24256
35350 CALL 35233
```

The length to load (DE) is taken from the position in the 17 bytes which gives the code length in a Spectrum header. So I assumed that it must be a standard header. The position (IX) is always 24267. The flag byte (A) is set to 255, by using SBC A,A with the carry flag set. The

loader is at 35233

```
35353 DI
35354 JP NC,35542
```

This is again to cope with loading errors. Because the level files consist of two blocks, as can be seen when loading a level, this must be the end of the loading.

I then disassembled the loader which started at address 35233

```
35233 INC D
35234 EX AF,AF'
35235 DEC D
35236 DI
35237 LD A,15
35239 OUT (254),A
35241 JP 1378
```

This jumps into the Spectrum ROM routine, and so this must be the end.

It seemed that I could copy levels using only this header reader to find their length, then loading them into memory and saving them to disc.

```
10 DATA 55,62,0,17,17,0,221,33,14,64
205,86,7,201
20 FOR X=16384 TO 16397: READ N: POK
E X,N: NEXT X
30 RANDOMIZE USR 16384
40 PRINT AT 1,0:
50 IF PEEK 16398<>3 THEN PRINT "NOT
CODE": STOP
60 PRINT "Name:": FOR X=16399 TO 16
408: PRINT CHR$ PEEK X:; NEXT X
70 PRINT "Start:": PEEK 16411+256+
PEEK 16412
80 PRINT "Length:": PEEK 16409+256+
PEEK 16410
```

The start addresses are not used by the loader. The lengths were:

```
"Level1" length 7287
"Level2" length 7287
"Level3" length 7287
"Level4" length 7521
```

I also noticed that the sixth character of each filename is a digit, and as this is decreased by 49 and compared with location 33353, I know that I can get the ASCII code of the

digit by adding 49 to PEEK 33353. It is important to be able to do this, as the disc cannot just "load the next level", it must know the correct file name

The routine at 35233 was far too short to be replaced by a disc loading routine, so I decided that I should replace the code at 35279. The code for loading the header, comparing level numbers etc was not necessary for the disc version, but the code from 35331 to 35337 may be important, so I included it in this loader, ensuring that it would fit between 35279 and 35357. Here is the source code for assembly.

```
ORG 35279
CALL 35491
LD HL,35644
CALL 35412 ;These calls are fr
om the original code
LD A,(33353)
ADD A,49 ;This will give the l
evel number as an ASCII code
LD (LEVEL),A ;Fill in the digi
t in the filename
LD IX,UF1A
RST 8
DEFB 59
LD DE,HEAD
LD B,9
LDBYT RST 8
DEFB 69
LD (DE),A
INC DE
DJNZ LDBYT
LD DE,24256 ;The level is alwa
ys loaded at 24256
LD BC,(LENGTH) ;Get the length
from the disc file header
RST 8
DEFB 61 ;Load the level
JR 35357 ;Take over where the
tape loader would have left off

UF1A DEFB 1,0,0,"d,4
NAME DEFB "WONDERBOY"
LEVEL DEFB "x"
;Note that NAME and LEVEL make up ten
characters in total
HEAD DEFB 0
LENGTH DEFW 0
START DEFW 0
DEFW 0,0
END EQU $
```


For more information on this loader, see the articles on Hook codes starting in FORMAT Volume 2 Issue 3.

I saved this source as 'WonderNS' and the object code produced by the assembler as 'WonderNO'. END was 35348, so it would fit into the space used by the tape loader.

I could poke this code into the game, but poking 69 bytes could take all day, so I hit upon a better (but riskier) method. I could load the code into the game by "tricking" the Spectrum into running the ROM load routine. I saved the code to tape, but let the header go past before starting the recorder (the pause button was useful). I now had a data block that I could load using the ROM.

Unfortunately, the Spectrum ROM routines hardly ever save the registers, so the game would be faced with a sudden inexplicable change of their contents. This meant that I needed to find a part of the game where this could cause no damage. The start screen seemed like a good point, as it is unlikely to write to RAM. For example if the game was clearing the screen, changing the registers could result in it "clearing" itself!

I reloaded the snapshot and entered the snapshot hacker. The stack contains all the return addresses, and the "JP" address shows where the game will restart on leaving the hacker. By reducing SP (the stack pointer) by two the JP address became a return address on the stack, and by giving a new JP address of 1366 (the ROM load routine) the game would jump to the ROM load routine and then, after loading, return to the point where I interrupted it by pressing the button.

I changed SP and JP as above, and set up the registers for a load, ensuring the carry flag was set, made A=255, set IX to 35279, and DE to 69. Then I returned to the game. The Spectrum entered the ROM load routine and was waiting for the block to load. I played the tape.

Once the tape had loaded, I snapped the game and renamed it as "Wonderboy" and protected the disc before testing it. I asked for a one player game, the disc whirred but when I started the level, the screen was filled with junk

I entered the hacker again, to check that the game had attempted to load the right level, by doing a text dump over the area 35279 onwards. It held "WONDERBOY1". And then I realised that I had copied the levels using their original names "Level1" etc. so I reset the Spectrum and renamed the level files as "Wonderboy1" etc. Having protected the disc again, and started another game. This time it worked.

The files "Wonderboy" and "Wonderboy1" to "Wonderboy4" could then be moved to a safe disc. Remember it is still possible to snapshot the game when you reach your highest level and resume it if you get killed!

SINCLAIR SUPPLIES

+2 COMPUTER (INC 24 GAMES).....	£90 00
+3 COMPUTER	£90 00
64K WAFES X2 £9 00 X5	£15 00
MEMBRANE (48+ OL, ZX81)	£10 00
48 / 128 / +2 POWER PACK	£14 00
+2A / +3 POWER PACK	£20 00
DEFENDER OR MAGNUM LIGHTGUN	£14 00
KEMPSTON INTERFACE	£10 00
KEMPSTON JOYSTICK.....	£6 00
SPECTRUM DATACORDER	£10 00
+3/+2 CASS LEAD/+3 J-STICK ADAPTOR	£5 99
+2/+3 SERIAL / PARALLEL CABLE	£9 99
DUSTCOVER 48 + 128, + +2, +3	£2 99
4 CF2 DISCS.....	£8 00
LIGHTPEN AND SOFTWARE 128/+2/+3	£12 00
AMSTRAD 3160 PRINTER	£110

SPECTRUM REPAIR
Only 210 M repairs for 48K/+3. Phone for +2/+3 prices.
Send working only with fault description.
Send ChipPO to
Omnikode Supplies, 23 Curzon Street,
Derby DE1 2ES.
Tel 0332 291219
Open Mon - Sat 10 - 9.30.

PRO-DOS

SAM'S METAMORPHOSIS

Reviewed By:- John Wase

Sam's what!!!!?? Metamorphosis - a change from one thing to something quite different. What is it? How well does it work? Read on!

You will have seen the adverts in FORMAT, from B.G.Services, for a program called ProDOS for SAM. You might well have seen that this implements CP/M. You might even be asking just what it is and if it's any use to you. Well, here's the lowdown.

Once upon a time, in the 1970's, there were, as now, all sorts of computers just appearing on the market. These (in those days were eight-bit jobs. CP/M was devised by a company called Digital Research as an operating system which would work on various makes of computer. Although each of these makes was different from the next, provided the computer could run the operating system, it could run a program designed to run under that operating system. In other words although all different, each computer could then run the same program. Lots of computers, all running the same programs. So programs which would run under CP/M proliferated.

Incidentally, a company called IBM (heard of 'em?) had some disagreement with DR in the late 70 s-early 80 s. So they chose a small, unknown company, one Microsoft, to develop a successor to CP/M. 'Twas called MS-DOS; the dreaded MS-DOS, and I guess you must have heard of that one.

Anyway, back to the fore-runner: CP/M. A version was devised to run on SAM after a conversation between Brian Gaff (of Micronet fame) and Chris Pile, the principal author. They were looking for a new project after experiencing comms problems with a quirk in SAM's RS232 interface (see last month's "Short Spot"). CP/M came

up in their discussions. Knowing that, at a guess, DR would have charged anything upwards of £10,000 for the original CP/M code, Chris, indicated that it would not be too difficult to reverse-engineer an implementation - and he was sober, too! So he observed RAM layout and the specified entry and exit conditions, and wrote the code appropriately to do the same job.

What came out was to be compatible with CP/M version 2.2. You see (at the risk of teaching Grannies to suck eggs), there is backward compatibility - CP/M 2.2 will run all programs designed for it or earlier versions, but not (necessarily) later ones. So CP/M+ programs will not necessarily run on CP/M 2.2. Unfortunately, Chris had insufficient documentation to emulate anything above version 2.2. Rest assured though, 2.2 will do. Most of the programs out there in the real world run in 2.2 or earlier.

So Chris carried on with his programming. Brian checked, bug-tested and criticised and Wayne Weedon, the third member of the team, collected and collated programs which he thought ought to work, mostly PD (which are available through him as a PD disc collection). There were some hiccups - SAM is pretty unobliging when it comes to reading the keyboard, which sports an enormous "bounce", leading to double inputs or none at all - try the original SAM version of Tasword 2 if you don't believe me. Some pretty involved code obviated this problem. And finally, there was a further delay when Brian persuaded Chris to implement some "extra" keys at a rather late stage. However, in the end, all was well, and in due course the expected parcel thudded on my mat.

Inside was a package containing a

Boot disc, a System disc and a 68-page A5 plastic spiral bound lie-flat instruction book. I like A5 lie-flat books - very practical. The instructions are, in general, clear and easy to understand, though there are a lot of grammatical liberties.

Can't sit staring at the box all day. In with the boot disc; press F9. Frantic activity inside the drive A big blue screen, which contains some advice about which drives are connected and the size of the RAMdisc. And a line, asking me to press any key. And then...the familiar A> prompt which has caused so much apoplexy in the past... And that's about the size of it. Just one point. The system disc contains lots of utilities, like FORMAT.COM and COPY.COM which you need to keep the system going. So the first thing is to make a copy of the system disc and put the master disc away where it won't get damaged. (Wase does this beautifully, year in and year out. And then can't remember where the disc is when it is wanted. So, if you have a number of discs to store, consider a filing system). And this is where a feature of ProDOS I just mentioned comes in - the RAMdrive. ProDOS will recognise the memory extension to 512k if you've got one and will configure the size of the RAMdisc accordingly. Unfortunately, it doesn't acknowledge the existence of the add-on RAMpack. Or is this fortunately; see later? Anyway, all you've got to do is to copy all your system files to the RAMdrive using COPY *.* C: it's pretty quick at that. Then if you do C: COPY *.* B:, a copy of everything will fly from the default disc (disc A) to disc B. Without the RAMdisc, you cannot copy from A to B without a copy of COPY.COM on disc A. And it's slow, too. All the utilities in RAM make things happen much more quickly and smoothly. Unfortunately, the boot disc is uncopyable. I'm not very happy about that, though I appreciate the reasoning

So there we are. We've formatted a new disc and copied all the system files over to it. What else will it

do? Well, the answer lies in the wide variety of professional and PD software already available to run on CP/M computers. You can get word-processors, databases and spreadsheets. In variety. More than 57 varieties. I now had Brian Gaff's PD disc to play with. And I also have three of Wayne's discs - 1 (file and disc utilities), 2 (file compressors and archivers) and 5 (text processing). As each disc is full of compressed files, you can get up to 1300k's worth of bits and pieces. Like the file and disc utilities issue contains 30 files. And the cost? Two quid, including postage and all. A real labour of love for Wayne. The other discs contain such goodies as cones, programming (lots of languages - fancy Forth? Or a "C" compiler?) and games. Wonderful! Can't but be good value.

Actually, there's not a lot I can say about Chris Pile's implementation. It does all the things one would expect of an operating system. It ought to, since it is. It does many of them clumsily, because it's CP/M, not because Chris Pile wrote it. Apart from a couple of special features, it fades happily into the background. And so it should

Features? There's a special command to read SAMdiscs. And another one to change screen colours. CP/M has bags of possibilities, like the original "model T": "paper" and "ink"; one colour for each. The default is blue with white letters, and I find this a pretty usable combination: a good choice

There's one or two interesting bits on Brian's PD disc. For one of them, I must first digress a little bit. If you have an Anstrad 6128 (or a Tatung Einstein, for that matter), you'll probably know that they both run CP/M as an operating system. And they both have those ghastly 3" discs: well, they're all right, but very, very pricey, and they don't hold that much either. You'll also recall how our favourite barrier-boy bought up the sailing Uncle Clive's outfit, glued a

data-recorder on his Investronicas (sounds painful), following with a swift stick-on 3" disc job; the Spectrum +3. What is perhaps not so well known is that the +3's disc drive operating system was imported (I don't know if they ported the code over or merely rewrote it, and I don't really care) from Amstrad's existing knowledge base. So it's essentially CP/M; bodged to accommodate the Spectrum header. There are lots of loose ends, like the dodgy implementation of user-areas, but it (mostly) works.

I'm lucky. I've got a Spectrum +3. And an add-on drive; drive B: which formats standard 3.5" discs to 706k. And these can be read directly on SAM with Chris Pile's CP/M program. So now we have a fascinating situation, haven't we. Indeed, experts like Brian Gaff are already well aware of the possibilities: on his PD disc, there's a little utility to strip off Spectrum headers... As well as the odd word processor, data base and spreadsheet. Nice one, Brian

So I could have a nice little play. For instance, I got hold of a copy of "Wordstar 3.00"; yes, the dreaded "Wordstar" on 3" disc. Transferred it to 3.5" on the +3 no header trouble just use COPY "A:A.*" TO "B:" and everything grinds across. Then I started to get problems. Once "Wordstar" is set up, it winds in various overlays from the disc. They come complete with instructions which are fed into the panel at the top. One overlay wouldn't. Cussed, decided I'd got a defective version.

So I went back to the Spectrum +3 and copied some ASCII files and some Teaword +3 files, and tried to look at those. Funny, they seemed to lack the start. Maybe the header.... Look for Brian's PD disc. Invoke his bit of header-stripping sorcery. No joy.

Things definitely went down-hill from then on. Eventually, in desperation, I sent Brian a collection of discs. He reported that there sure was some problem. Textfiles had the

first sector marked by CP/M, but that was all; completely blank; no ASCII codes. Even the COPY.COM program was defective. A crazy situation. At that point, I balked. I just hadn't the time to spend endless hours playing. Up to this point fate had been, to say the least, unhelpful. Now, at last, there was a positive intervention. I needed to see Andy Wright. He asked me if I could transfer "Wordstar to 3.5" disc I took a sample over to him, mentioning the problem - and then stood, amazed, when the overlay quietly loaded in the version I handed to him. I went home that night in some confusion.

I made two more copies. I checked them. Neither worked on my SAM. I put one of them in my pocket and SAM in the car boot. Next day, I called on Andy in the lunch hour - poor Andy: I always interrupt his lunch.

You've guessed it. It worked on his, but not on mine. We then started playing with the add one. If you took the backplane (complete with other bits and bobs) out of the output port, all was well. Mystified, I went home and did a systematic test on SAM's backplane with a 1 Megabyte RAM and a parallel printer port/driver controller. My results were as follows:-

Para 1a	not drive only	in slot 1	OK
Para 1b	not drive only	in slot 2	OK
Para 1c	not drive only	in slot 3	OK
Rampack	only in a	slot 1	OK
Rampack	only in a	slot 2	OK
Para 1a	not drive in slot 1	Rampack in slot 2	NO
Para 1a	not drive in slot 1	Rampack in slot 3	NO
Para 1a	not drive in slot 2	Rampack in slot 1	NO
Para 1a	not drive in slot 2	Rampack in slot 3	NO
Para 1a	not drive in slot 3	Rampack in slot 1	NO
Para 1a	not drive in slot 3	Rampack in slot 2	NO

(B slots numbered from front to rear)

So there you have it. We're back to the "old" problem. Just like the good old days of Uncle Clive. Not quite enough power to run the add-on bits and bobs. The result was weird, looking like RAM failure. Indeed, I mentioned that in a previous "Short Spot" and got a RAM check from Brian. Moral; something about counting chickens. Funnily enough, this was about the same time that Bob failed to run a demo disc when the backplane was

connected. So watch out, there can be trouble there

And that all but wraps it up. I just ought to mention that Wayne PD library is called FDOS. Odd name but good value. Overall, this is a good and bug-free implementation (provided there aren't too many add-ons). You have all the standard CP/M facilities. You can get ASCII from SAMdiscs. You can change the screen colours and you can get lots of software cheaply, either through the FDOS or other PD libraries. At thirty quid, it's good. My only reservation is that there is only one programmer, who has distanced himself from the one seller, who is also responsible for technical backup. Fina, until something goes wrong. You could then be left with a legacy of useless programs, as the boot disc is heavily copy protected. This is by no means the only program sold in this way: if you're prepared to take the risk; great.

Pro-DOS from BC Services, 64 Roebuck Road, Chessington, Surrey, KT9 1JX. Tel 081-397-0763; Fax 081-391-0744

FDOS PD Library from PDOS Public Domain, 1 Mapperton Close, POOLE, Dorset BH17 8AF. Tel. 0202 600305; 6-9.00 pm.



'How did the first day of your diet go, dear?'

PRIZE WORDSQUARE RESULTS

Christmas seems so long ago, although I'm still getting pine needles out of the carpet. But it is time for the results of our Christmas Prize Wordsquare.

This produced more entries than ever before. With the exception of two which had no identification on, and another three that were not correct, the sheets were folded up and placed in a box. The lovely Jenny then had the exciting job of drawing the winners. As with Miss World, the results in reverse order.

The ten runner up prize winners, each of whom receive an extra THREE months subscription next time they renew, are as follows.

Mr R.Webster	- Australia
Mr C.Crane	- Stoke on Trent.
Mr C.Filby	- Beccles, Suffolk.
Mr F.Elstrodt	- The Netherlands
Mr K.Gould	- Neighington, Lincs.
Mr C.Ingram	- Malawi.
Mr D.Lorner	- Clevea, Avon
Mr C.White	- Frome, Somerset.
Mr C.Fairley	- Aberdeen, Scotland.
Mr B.Hatchett	- Eastleigh, Hants

Congratulations to you all.

And the winner, the lucky person who walks off with ONE YEARS FREE SUBSCRIPTION, is..... Wait for it...

Corrado Nieddu from Italy.

Well done Corrado, next time you receive a renewal reminder from us just send it back claiming your years membership.

My thanks to all who took part, with luck there will be another Word Square this December. Oh, yes, there were a few Qs (it was the program that did it) we accepted any one.

MACHINE CODE WITHOUT THE TEARS

Part 9.

By:- Carol Brookbank.

Before we go on exploring the screen, I want to look at the commands used to call machine code, because it is clear from my postbag that there is some confusion about them.

The heart of the command is usually `USR nnnn` (nnnn is the calling address of the machine code). The various versions have different effects, so you must use the one which is most appropriate.

`PRINT USR nnnn`. This will run the machine code routine and, on returning to BASIC, print out the number held in the BC register. It should only be used if you want to see this number (on screen or printed, depending on your machine code). It is very useful if your routine has performed some calculation and you want to see the answer - just make sure the answer is transferred to BC immediately before RET. It is no use if you are printing graphics or messages - you won't want stray numbers all over the place

`LET A=USR nnnn`. (A can be any suitable variable). This is a very useful all-purpose command. It runs the machine code, and on returning to BASIC, instead of printing out the contents of BC, it puts the number in the variable, so it is there if you need to use it. If it isn't important, you can simply ignore it.

`RANDOMIZE USR nnnn`. This is another all-purpose command, probably the one most used by Spectrum programmers. After running the machine code, it does not carry any numbers out to BASIC, so it does not need a variable, but there is one drawback. It affects the seed used to determine the sequence of random numbers. If you are using random numbers, in your machine code or BASIC, it could result in the sequence being always the same. Random

numbers tend to lose their charm when the "big picture" comes round again time after time, so never use `RANDOMIZE USR nnnn` if you are using random numbers in any of the BASIC or machine code routines which make up your program

`IF USR nnnn THEN`. This rather odd looking command will not be rejected by your syntax checker - it will run your machine code, and do so without changing the BASIC in any way. `PRINT USR` changes the screen display or printout, `LET A=USR` changes the variables and `RANDOMIZE USR` changes the seed. This one leaves BASIC untouched, and if that is important, this is the command to use

`CALL nnnn`. This one is only for SAM users. I am not using it in this series because I prefer to use commands available to everybody. It works like `IF USR nnnn THEN`, so SAM users can always substitute it for that, for `RANDOMIZE USR`, or for `LET A=USR` if you do not intend to make use of the number put in A from the BC register

Now back to where we left off last month. First, we must look at the way SAM users page their screen in and out. But stick around, Spectrum users, because you will learn some commands and procedures you need to know about. And I shall assume that, after this section, you know all about `IN` and `OUT`, and using `AND` and `OR` to manipulate numbers held in just two or three bits in a byte.

SAM screens live very high in memory. The 512K SAM screen 1 starts at 507904 - way above the 0-65535 range that the Z80 chip can address, so there must be a way of transferring the screen file to somewhere between 0 and 65535 when we need to use it.

The whole of SAM's memory is organized into 'pages' of 16384 bytes, four of which can be in use at once between 0 and 65535. We call the four 16384-byte slots for the pages in use A, B, C and D. Pages are switched in pairs - you swap 2 next door pages from upper memory with the ones in A/B, or the ones in C/D. When you switch SAM on, page A has a vital part of the ROM in it - ROM0. Messing with that is not wise for the inexperienced, so we shall not be meddling with slots A/B (addresses 0-32767).

Screens are always at the beginning of a pair of pages, and we shall put the pair in slots C/D (addresses 32768-65535). Our mode 1 screen occupies only the first 6933 bytes of the pair (6912 pixel status and attribute bytes you have in common with Spectrum screens, plus the palette status bytes).

However, we must put our machine code routine below 32767, or it will be paged out when the screen comes in and will not be there when we try to run it - the address we called would be in or above the screen file, while our precious machine code routine would have gone off to where the screen file usually lives when it is not paged in. CRASH

I hope Spectrum users now understand why I shall often be using low ORG addresses when poking into the screen is involved. It would be quite acceptable to you to use higher addresses, but SAM users would be in deep trouble.

So, how is the paging done? Last month we met the Video Memory Page Register, (VMPR) Port 252. We found the current screen's (page number-1), in bits 0-4 of the byte we input from that port. There are two other ports used in paging.

The Spectrum has ports too, of course. For example, port 239 controls the microdrive, and various bits will tell you such things as whether the current drive exists and whether the cartridge is write protected

In SAM, the memory paged into slots C/D, 32768-65535, is controlled by the High Memory Page Register (HMPR), port 251. Bits 0-4 hold (page no.-1) of the page in slot C, which is always an odd number page. The next page up will be in slot D starting at 49152. If page 31 is in slot C, bits 0-4 will hold 30, BIN 11110 (page 32 will be in slot D). To do this we put a byte whose bits 0-4 are BIN 11110 in the A register and write it to port 251 using 'OUT (251),A

Port 250, the Low Memory Page Register controls the pages at 0 and 16384 (slots A/B) in exactly the same way. We shall not be changing that so we shall not touch bits 0-4 of that port. But bits 5-7 control the way the ROM is arranged, and we do have to make sure that is as we want it.

SAM is versatile, because you can page ROM0 out and put RAM at 0-16384. SAM/Spectrum emulators put a copy of the Spectrum 48K ROM there, and then SAM thinks it is a Spectrum. If you are using something like an alternative ROM, you need to write-protect it, and that is done by setting bit 7 of port 250. If you set bit 5 of port 250, SAM's ROM0 is paged out and replaced by RAM in slot A. You put your substitute ROM code in slot A, and set bit 7 of port 250 to write protect it. SAM has another page of ROM - ROM1 - which can be put at 49152 by setting bit 6 of LMPR. The two sections of ROM can be paged in or out, whatever memory pages are in the slots, just by changing those bits and writing the byte to the port. We want SAM's own ROM0 at 0, which doesn't need write protecting, and RAM at 49152, so we have to make sure that bits 5-7 are all reset. Fig. 1 shows you what the bits of all three ports we shall be using do.

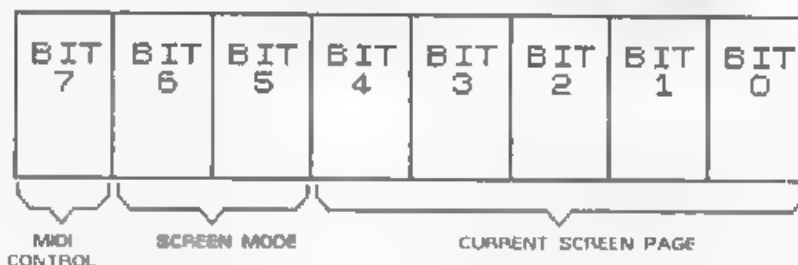
So now for our two screen paging routines. The first one puts the screen file at 32768.

```
LMPR EQU 250
HMPR EQU 251
VMPR EQU 252
PRESKIGH DEFB 0
```

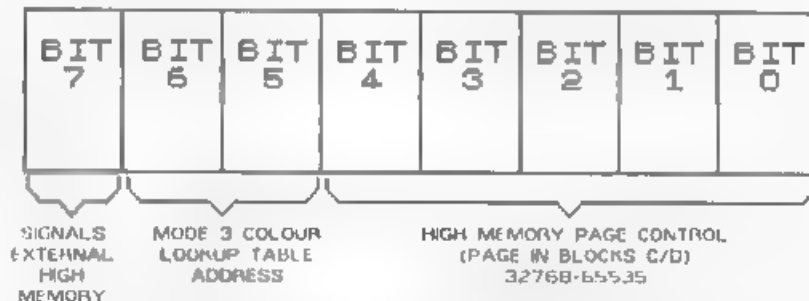
GETTING IN AND OUT - SAM'S PORTS



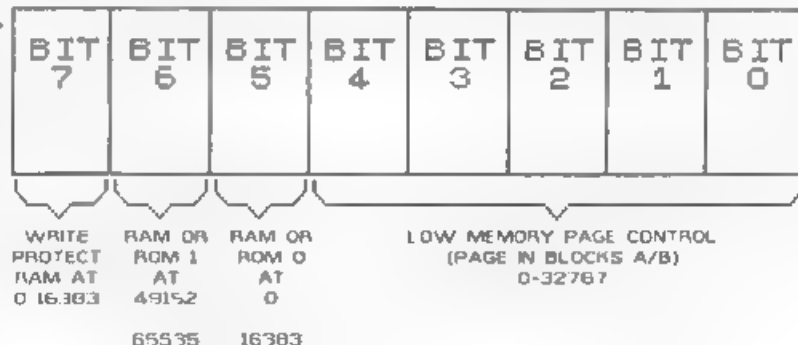
PORT 252
VIDEO
MEMORY
PAGE
REGISTER



PORT 251
HIGH
MEMORY
PAGE
REGISTER



PORT 250
LOW
MEMORY
PAGE
REGISTER



We set the port numbers as variables, and leave a byte for storing the present value of HMPR.

```
SCREENIN IN A,(LMPR)
AND %00011111
OUT (LMPR),A
```

The routine is called from SCREENIN, its second byte. (PRESHIGH is the first). We fetch the LMPR byte, use AND binary 00011111 to reset bits 5-7, leaving bits 0-4 undisturbed, and write the byte back to LMPR. This makes sure we have ROM0 at 0, and RAM at 49152. Check your assembler handbook to see what sign is used to indicate binary numbers. Many, but not all, use %.

```
IN A,(VMPR)
AND %00011111
LD E,A
```

We fetch the byte from VMPR, and use AND binary 00011111 to reset bits 5-7, leaving only the current screen page number in A, and then copy the page number to E. We don't have to worry that the number is actually (page no.-1) because all the ports store pages in the same form.

```
IN A,(HMPR)
LD (PRESHIGH),A
```

We fetch the current state of HMPR and save it in PRESHIGH for future use

```
AND %11100000
```

Reset the page number bits to clear out the old page number, but don't change bits 5-7 which are nothing to do with paging.

```
OR E
```

Put the screen page number in bits 0-4 (bits 5-7 of E are all 0).

```
OUT (HMPR),A
```

Write the byte to the HMPR port, and the screen file is now at 32768 so we exit.

Paging the screen out is really very simple. All we have to do is restore HMPR to what it was before we paged it id:-

```
SCREENOUT LD A,(PRESHIGH)
OUT (HMPR),A
RET
```

Look back to part 7 to remind yourself of how AND and OR work so that you are sure you understand how we use them to work with the groups of bits in a byte.

SAM users should use the assembler to write SCREENIN and SCREENOUT and save them as a "library" routine. Most assemblers will let you merge library routines into your program source code, some will even assemble them straight from the disc, without even needing to put their commands into your present source code.

SAM and Spectrum users should also make library routines of the three I gave you last month, NXCELL, NXDOWN and FINDATTR. We shall be using all these routines a lot in future, so if you have them on disc ready to merge it will save you (and me) the bother of writing them all out again whenever we need them

So, how do we poke, say, the code for a letter into the screen so that it is printed?

If you look back to Part 5 of this series, in the December 1991 issue you will see from fig.2 that the 8 bytes required to print a "Q" are, from the top:- 28,34,34,34,42,36,26,0.

Last month's survey of the screen showed how, in the Spectrum and SAM mode 1 screens, if you have the top byte of a colour cell in HL, INC H will find the next byte down so long as you stay in the same cell. So, if we load HL with the first byte in the screen, (16384 to Spectrum users 32768 to SAM users - after CALL SCREENIN of course).

```
LD A,28
LD (HL),A
```

INC H

would put the top byte of "Q" into the top left corner of the screen and move down to the line below ready for the next byte.

Here is a routine for you to try which will print the whole letter:-

```
SCREEN EQU 16384 (Spectrum users
only)
SCREEN EQU 32768 (SAM users only)
QBYTES DEFB 28,34,34,34,42,36,26,0
START
LD B,8
LD HL,SCREEN
LD DE,QBYTES
OLOOP LD A,(DE)
LD (HL),A
INC H
INC DE
DJNZ OLOOP
RET
```

SAM users must insert START CALL SCREENIN above LD B,8 and delete the existing START label. They must insert CALL SCREENOUT immediately before RET. They must also add the two routines SCREENIN and SCREENOUT at the end, after RET Everyone must add

```
END EQU $
LENGTH EQU END-QBYTES
```

at the very end.

Read your assembler handbook to see how it merges library routines - if it doesn't handle them at all, SAM users must type in SCREENIN and SCREENOUT.

You can ORG this routine to anywhere you like, but SAM users should make sure it all falls below 32768 - I recommend 32500 as a safe place. After you have assembled it and saved your object code, (LENGTH in the assembler symbol table will tell you how many bytes you have) find the address of START from the symbol table. Reset your machine, use CLEAR (your ORG address-1), load the code to your ORG address, and use whichever of the call commands you judge to be suitable to run it, calling it from START. SAM

users must also use the BASIC command:- MODE 1: PALETTE before calling the machine code.

This little exercise will give you some practice at using your own judgement about where you store your code and how you call it. If you got it right, the letter "Q" will appear in the top left corner of the screen, poked there by you without any of the help from the ROM which you were getting with RST 16.

I think that is enough for this month, write to me care of FORMAT if you are having any problems (but make sure you have re-read the whole series first).



THE HACK PACK £8.99

The ultimate hacking package created by a professional hacker. Six programs which enable you to hack or crack protection on games. Find infinite lives, disassemble code - the scope is limitless. Complete with special instruction booklet featuring expert hints/tips and example hacks.

20 CHARACTER SET FONTS - £4.00

Twenty character sets for your programs

SPEEDY LOAD/SAVE - £4.99

Convert your programs to fast load like the professionals

INTERRUPT SOUND EFFECTS - £3.99

Create amazing interrupt driven sound effects that run without stopping program execution

PROGRAM PROTECTION TOOLKIT - £4.99

Expert routines and tips package to protect your programs from hackers. Developed over years...

DRUM BEAT MACHINE - £3.99

Add your own custom built drum rhythms to your programs

GAMES AID - £3.99

Toolkit of routines and tips to help creating your own games.

POKES GALORE - £3.99

MESSAGE SCROLLER - £2.99

DOUBLE HEIGHT PRINT - £2.50

SPI DROID £2.99 LASERWAR - £2.99

Send two 22p stamps for full catalogue. Add 50p P+P unless ordering more than one program.

SIGMASOFT

DEPT F 8 PINE DALE, RAINTON, MESSINGHAM, WILT BA9

PBT ELECTRONICS

P.B.T. Electronics Ltd., Unit 17, Port Talbot Workshops, Addison Road,
Port Talbot, West Glamorgan, SA12 6HZ. Tel No. 0639 885008

SAM COUPÉ 512K COMPUTERS

SAM Coupé + 1 Disc Drive.....£199.99
SAM Coupé + 2 Drives.....£275.00
SAM Internal Disc Drive.....£79.95
SAM 256K RAM Expansion.....£29.95
SAM Comms Interface.....£29.95
SAM External Disc Interface...£79.95
SAMCO Mouse.....£39.99
SAM Technical Manual.....£16.99
SAM MasterDOS.....£15.99
SAM Dust Covers.....£3.99

PARALLEL & CONNECTORS

Parallel Printer (BBC/+D).....£7.99
Parallel Printer (+3 Type).....£7.99
Serial Printer Spectrum Type...£8.99
Spectrum Cassette Leads.....£1.99
SAM Scart to Scart.....£9.99
SAM Dual Joystick Adaptor.....£7.99
BBC/+D Dual Drive Connector...£14.99

SPECIALS

Lockable 3.5" Disc Box - 40....£3.99
Lockable 3.5" Disc Box - 80....£5.99
3.5" Bulk DS/DD Discs in 10s...£4.00
3.5" 80Trk Disc Drives.....£99.99
Citizen 120D Printer Ribbons...£3.99
MT81 Ribbons.....£4.49
Monitor Dust Covers.....£4.99
Printer Dust Covers.....£3.99
Star LC10 Ribbons - Black.....£4.59
Star LC10 Ribbons - Colour....£7.99
3.5 or 5.25 Disc Cleaning Kits.£2.99
Printer Switch A/B.....£23.99

DOT MATRIX PRINTERS

Citizen 120D (Parallel).....£139.99
Citizen 124D.....£195.50
Citizen Swift 9 Colour.....£199.99
Citizen Swift 224 Colour.....£269.99
Citizen Swift 224E Colour...£299.99
Seikosha SP1900.....£124.99
Seikosha SP2000.....£139.99
Printer Stands.....£4.49
SAM Colour Dump Software.....£8.99
(FREE on request with Swift 9/224 Colour printers)

SPECIAL FORMAT OFFERS

Citizen 120D Parallel Printer Pack	Citizen Swift 9 Colour Printer Pack
£155.00	£225.00

Both packs include Printer, SAM Parallel Interface and Cable.
Colour Dump software also supplied with Swift 9.

MGT DISC DRIVES AND PLUS D INTERFACES REPAIRED WITH 3 MONTH GUARANTEE.
Please phone before sending repairs

BLUE ALPHA'S SAM PRODUCTS

NOW PRODUCED BY P.B.T.

THE JOY-MOUSE (works with FLASH + all other current software) £29.99

SOUND SAMPLER - Complete with software and FREE microphone £39.99

VOICE BOX - Make your SAM speak to you. £29.95

•• Extra Special INDUG Members Offer ••
Buy Voice Box and Sound Sampler Together For Just £54.99

All prices include VAT at 17.5%.
POSTAGE & PACKING: Printers/Computers £5.00 All other products £1.00
Make Cheques/Postal Orders Payable to PBT Electronics.
Allow 28 days for UK mainland delivery.



YOUR LETTERS



Dear Editor,

I enjoy FORMAT from cover to cover. I am writing this, hopefully you can read it, but am very frustrated.

I have received the latest copy of FORMAT (April '92), but can not read it because I have mislaid my glasses. Please carry on the good work.

Yours sincerely, M.Jones.

I felt very sorry when I read your letter. I wouldn't know what to do if I lost my glasses. If you can't find them, let me know and I will have a word with Bob and see if we can get your next FORMAT enlarged so you can read it. Jenny.

Dear Editor,

You ask in your editorial, in the March '92 issue of FORMAT, for details of any bugs readers have found in the SAM. I have found a bug which has been driving me crazy. I have a SAM without disc drive but with the latest ROM chip. (I just fitted it today). The problem however is present in the latest as well as in the earlier ROM.

I came across the problem almost by chance. I have a long program in Basic (Home brewed) that I use to store my bank statement data and my own cheque book accounting. The program has several routines for totalizing, searching and checking correlation between bank statements and cheque book totals. I wanted to include graphics showing cash flow. The program simply plotted entry numbers on the X axis and running totals on the Y plotted alright but there was no horizontal movement. I then tried just the direct entry of DRAW TO 250,173. I just got a vertical line instead of what should have been a diagonal from bottom left hand corner to the top right hand corner.

Typing CLEAR and then trying DRAW TO 250,173 now gave the right

result. Re loading the program from the tape again gave the no X axis result. I then tried loading other long Basic programs and checking if there was a slight X axis deflection, so I increased the first number. Using Mode 3 I managed to get a full diagonal across the screen with the diagonal and the OK sign came up at the bottom of the screen. Trying things out in Mode 1 and I ended up with DRAW TO 8175,173 giving the full diagonal. Entering CLEAR and trying again restored things to normal.

The effect only seems to work with programs running to 400 or so lines of program. I tried deleting chunks of lines but the bug remained even when I deleted the whole of the program.

I am at a complete loss on how to cure this problem and until I do I cannot have cash flow graphs in my bank statement checker.

I shall be very interested to know if other readers can reproduce this weird effect or have I got a dicky SAM.

Yours sincerely, Peter Williamson.

Look at the problem reported by Mr Jess which Nev deals with in this months Help Page. Let me know if you still have a problem after resetting the system variables. Ed.

Dear Editor,

Just finished reading my first magazine. What a refreshing change after garish colours and a low average mental age! Listings too - takes me back to the times when Spectrum magazines were something to read and not just a lot of pages of games adverts!

With reference to your request for articles I'm not very into programming - more handy with a screwdriver, test meter and soldering iron. A couple of useful mods I've made to my +2.

1) A tape counter - requires a small

unit salvaged from a cassette player, car-boot sales are a good source.

2) An extreme cassette 'load' modification to the +2k enabling more control over loading levels - allows troublesome programs to be 'blasted in'. If either or both contributions are of any interest I will be happy to forward details. The 'load' modification doesn't disable the +2's cassette deck which is useful and generally very good. Far too useful to just disable it which is the negative approach I've seen recommended.

I have a second hand Microvitec 'Cub' colour monitor with the Spectrum +2 into the TTL socket works OK but only 8 colours - no 'bright'. I have a Spectrum +3 - can you tell me how to connect it? Is it possible to take composite video from the feed to the TV modulator in the Spectrum to drive the 'cub'.

Yours sincerely, David Wood.

Readers may well be interested in more details of your mods David, try to put a short article together - ring me if you have any problems. In the meantime I'm sure someone will help with connections for your monitor. Ed.

Dear Editor,

I have finally succeeded in getting Carol Brooksbank's first few machine code programs working, the first two being easy.

The assembler I am using was the main problem. When loaded to it's normal low position in memory, an ORG at 26616 for the tag string sort was not acceptable. By trial and error I found a high memory location for the assembler which would cope with a large program and low ORG.

The remaining obstacle was accuracy both in typing in instructions but, more so in my case, in combining the tag string sort programs which initially I made a botch of. The OWL to screen went well (experience showing?), but I cannot use the OWL to printer one as my Serial 8056 printer does not have graphics capability.

Keep up the good work Carol! I've almost cried, but not quite!

Yours sincerely, Roy Burford.

Dear Editor,

Can you please let me know of any source of material on tape for the SAM Coupé. I recently passed my Spectrum on to my grandchildren and purchased a tape version of the Coupé only to find that the odd utilities I had seen advertised, were no longer available.

Before I close, could I say how pleased I am that I subscribed to FORMAT and found that you publish programs to type in. Without the help I get from them I would have had a difficult time with the Coupé.

Yours sincerely, Mr T.Thomas.

At this moment there are not many programs for SAM available on tape. However SAMCO's plan to relaunch the 256K machine will result in more games being produced on tape. Having said that, I don't foresee many utilities being produced except on disc. A disc drive should be your first purchase if you intend to use SAM as a serious machine. Ed.

Dear Editor,

At the recent "Computer Fair" here in Glasgow one of the exhibitors suggested you may be able to help me with a problem I have with my printer. It is a SERIAL 8056 and I am attempting to operate it with my SPECTRUM 128+2. The problem is there is no connecting plug coming from the printer only 4 WIRES:- BLACK (two of them), RED, WHITE, and a SCREEN.

I have a serial connector which plugs into the MIDI-SOCKET of the computer and has 6 Wires coming from it:- BLACK (GND), RED (CTS), BLUE (DTR), GREEN (RXD), ORANGE (+12V), and WHITE (TXD).

The problem is which wire goes where? Any help would be greatly appreciated.

Yours sincerely, J.Quinn.

Anyone out there know the right connections? Ed.

Dear Editor,

It was good to read K.D.Barrett's letter in the March issue. I was beginning to think that there was something wrong with me as far as

Datel Electronics was concerned.

About two years ago I ordered some tapes. Not a word in reply for three weeks and when I 'phoned them, the excuses were unbelievable. The first was that the programs had not been taped at the time. A fortnight later the excuse was (even I had to ask twice) they were being held up by Customs.

Needless to say, when I finally received the tapes four months from the date of order, I said that I would never deal with them again. However, now that I want to change to disc and want a PLUS D, the only outlet from new is Datel Electronics. I wrote to them a month ago asking for the price details. Two weeks passed and no reply so I phoned them. The answer was that "If I would be patient someone would get round to my request". I have even written to their MD but no reply. How can these firms, with a total monopoly, stay in business. Or is it a case of not bothering with the humble Speccy.

Yours sincerely, R.Hatchett.

Datel do have a bad name when it comes to customer service. Try EEC Ltd on 0753-888866, they stock the PLUS D and have a much better reputation. Ed.

Dear Editor,

Re SAM Coupé Bugs The bug I have frequently encountered is the so-called "Reverse listing bug", which I believe was first reported by Alan Cox, this causes the SAM to crash when scrolling upwards through a long basic (My own program over 300K long) listing. However this bug does not happen when MasterBASIC and MasterDOS[®] are in use.

Incidentally I use four SAM's in my business and have found them extremely reliable with the worst problem to date being a noisy power supply which rattles ominously if shaken but still works OK.

Yours sincerely, S.H.Burton.

Dear Editor,

I am practically 70, but for the past 8 years have enjoyed working with the ZX81, Spectrum, +2 and now SAM. Not that I am any good at programming

but I like puzzling over various programs produced by others, particularly in relation to Family Tree work.

For instance I have used Masterfile and have managed to transfer it to SAM using LERM's SAMSPEC. Unfortunately, I have not yet been able to print from the program on SAM - so if anyone can help me I would be grateful. On contact with Campbell Systems asking them if they would be making their system available on SAM using the larger memory facilities, I was told they were no longer interested in the smaller computers.

Why is there not yet a really good data base for SAM? I have tried SC-File, but am exceedingly disappointed with it. I seem to have spent hours with little success. It took me hours to get the program to work - one has to go over all the steps to find out if one's entries are correct.

I have a very large "card" of data with some 50 "windows" which work with Masterfile, but SC-File with 10 times the memory cannot take more than 31 windows. There is no mention of this in the manual. Furthermore I love having about a dozen lines of data in front of me as Masterfile will produce, not the single lines produced in SC file - how can that be done?

So how about one of you wizards altering Masterfile for me, I'm too old in the tooth to learn the art of programming!

Yours sincerely, Dr E.J.Wilson.

Masterfile will work on the SAM under most of the commercial emulators but will only give the same storage as the Spectrum. As it is written in machine code it will prove difficult to convert fully to SAM and its extra memory. I'm not exactly sure what you mean by "cards" and "windows" so I'm at a loss to understand why you get so little into SC File.

Still, there is now a disc based filing program from Beta Soft, this may well answer your needs. And you are never to old to learn, so keep trying. Ed.

Software for the SAM COUPE

£12.50 **SC ASSEMBLER**

If you have been reading the much praised article in the Format magazine 'Machine Code Without The Fears' by :- Carol Brooksbank and are new to the fascinating world of Machine code.

SC_ASSEMBLER is the ideal program to help you, thanks to the unique automatic autotab editor designed to help the absolute beginner. Review in 'Outlet' Issue 53 Jan 92 "Simple enough for the beginner powerful enough for the expert". Format vol3 no12 "A delight to use, it's certainly the one for me". Highly recommended by Carol Brooksbank

£12.50 **SC FILER**

A POWERFUL SAM COUPE DATABASE

99% Machine code, Data compressed to allow massive storage of data. You can set up the database to your exact requirements, with fields of any size position, colour and charset in 4 different Mode 4 layouts and printouts. Review in 'Sam Supplement' Issue 7 "Very versatile userfriendly database" 'Outlet' Issue 47 "Most professional looking file management program". 'Enceladus' Issue 7 "definitive filing system, if you need to file anything but this". 'Fred' Issue 9/14 "I would recommend you buy SC_FILER" 'Excalibur' no3 "Best Database around 94%".

£15.00 **SC MONITOR**

SC_MONITOR is an essential utility to use with an Assembler to help understand, debug machine code programs. Single step each opcode to see what it does and the effects it has on flags, registers, memory and screen. Various special types of breakpoints will help pinpoint bugs and resets in programs. Unlike other monitors incl CP/M, this monitor copes with all opcodes, paging types on SAM without crashing. There is also a super fast intelligent disassembler. SC_MONITOR comes with a large, comprehensive and easy to use manual with examples to help beginners

£15.00 **SC AUTOBOOT**

SC_AUTOBOOT is a new exciting chip for the Coupe. When you now turn on the power to the Coupe with a disc already in the drive, (disc will not corrupt) the DOS will immediately BOOT up. Retrs back to basic if no disc in drive No need to eject disc, turn on power, wait 3 secs, insert disc and press F9. Remains 100% compatible with the most up to date ROM 3.0 chip, which software companies guarantee software to work with 100%. The chip also has a powerful reset button to Break into any program running. The chip is easy to fit with an easy to follow manual.

£2.50 **SC PD3**

A Completion of SC_PD1 (Specclone-Spectrum emulator, Disc Utility, Screen Compressor 1) SC_PD2 (Screen Compressor 2), also included as a Bonus SC_DISCLONE, a super exact clone disc copier.

MORE INFO

Just send a blank formatted disc & a SAE for Demos/Screen Shots/Detailed Information on current software from STEVES SOFTWARE

FAST ORDERS

If you need any of the above items quickly, then just phone from 6pm-9pm, your order will then be despatched first thing next morning, when goods reach you, just send a cheque or postal order for invoiced items.

DUST COVERS

High Quality Dustcovers, Pure White with Blue Rim Trimming, Waterproof, Machine Washable, Non Shrink, Non Fade
£5.50 SAM COUPE
£6.50 PRINTERS
£7.50 MONITORS
 If Ordering Printer or Monitor cover Please state Model.

STEVES SOFTWARE

7 NARROW CLOSE

HISTON
 CAMBRIDGE
 CB4 4XX

TEL 6pm-9pm
 0223 235150

Special Offer Buy SC Assembler-Monitor For £24. Save £3.50. Upgrade from Assembler to SC_Monitor £12

STEVE'S SOFTWARE is a member of TEAM SAM

MODULA 2

Reviewed By:- Nev Young.

Over the years that I have been associated with FORMAT I have been sent a large number of programs in order that I might review them and possibly fill a page or two in FORMAT. Regrettably most of them are so dire that they do not warrant the cost of the paper any such review would take. A few have been as good as mediocre, but only a few have actually inspired me to sit down and write about them. Recently I was sent a real gem, that rare thing, a really good program. My only regret about it is that I have not been able to spend as much time as I would like using it but I am sure that I will. The program in question is the Modula-2 compiler from MIRA software.

The compiler is available on two formats, cassette and DISCIPLE/PLUS D disc. Both versions are really the same and contain 73 or 77 files. The reason for the large number of files is that not only the PLUS D disc is supported but also BETA, WAFADRIIVE, OPUS, +3, MICRODRIVE, TAPE and RAMDISK on the 128K machines. It is also possible to write other drivers to make use of other systems but you would need to be something of an expert to do that. During installation it is possible to customize your working copy to your system and then you can dispense with the other driver files. But because of the way it works if you write a program to work with a PLUS D and then want to run it on an OPUS system all you need to do is supply the OPUS runtime disc driver module. This makes a very flexible and relatively easy to use system. (I didn't see a Uni-Dos driver anywhere though, but the PLUS D drivers worked OK).

Also on the disc are 32 library modules that contain routines that you can use within your own programs. All

of these are very well documented in the 56 page manual. You also get 4 demo modules that you can compile up into runnable programs. There are CLOCK; an example of real time programming using concurrent processes (two programs running at once), Starbase; an astronomical database, ROUTE; Just like the Autoroute programs you get on the PC, and SYMDES; a symbol designer program. These are also documented with the accompanying data sheets.

All programs, when compiled, will work as stand-alone code programs and do not need the compiler loaded. So your programs can be passed on or sold without any infringement of copyright.

So what is MODULA-2? That is quite hard to answer, it was invented by Niklaus Wirth who also invented PASCAL. In many ways MODULA-2 is like PASCAL but it is greatly extended. By splitting your programs into modules not only can you re-use code from one program in another but you can keep the size of the module you are working with down to a reasonable size. MODULA-2 is widely used by the 'Object Oriented' fraternity of computing. It also, as mentioned above, will allow you to run concurrent processes which in this case will let you do more than one thing at once. MODULA-2 is a strongly TYPE oriented language, that is to say variables of any particular TYPE (eg INTEGER, CHAR, BOOLEAN) can only be moved to compatible TYPEs, although this can be overridden if necessary. This compiler is based on the third definition of the language by Wirth and in any place where it deviates from that definition it is documented in the manual.

The manual itself is in 5 parts. The first covers the use of the built in editor and the compiler itself. The

editor is simply dreadful. It works but it is far better to use a word processor for your editing and then read that file into the compiler, using the editor just for correcting any small silly mistakes that you may have made. I am sure that it is possible to write programs as it stands but single line entry is not the best way of seeing what you are doing.

The second part is a short tutorial on MODULA-2 itself. This is just over 20 pages long and moves very fast. As it says if you really want to learn MODULA-2 then get a book that is more to your liking. Much of this section reads as if it has come from the definition book and could be a bit daunting if you have never used this type of language before. It is NOTHING like BASIC. However, if you are serious about programming and perhaps intend to make a career out of it then this will certainly do you no harm at all.

Section 3 describes the implementation giving the range of predefined types and so on, as well as giving a list of the reserved words and predefined identifiers. That is those words that mean something to the compiler before you have done anything. It then goes on to describe the compiler directives like turning off run time error checks. Section 4 is a list of error messages both compiler and runtime.

Section 5 takes up the last 20 pages of the manual and describes the library modules that come with the package. These are all well described giving a listing of the definition modules of the libraries. The libraries provide functions such as standard input and output, loading and saving, string manipulation, keyboard scanning, interrupt handling, maths, graphics, sprite handling, and interaction with basic. This last one opens up many possibilities as it will allow you to call the MODULA-2 program from basic via a DEF FN and the parameters can be accessed by MODULA-2. So you could use MODULA-2 to

produce a number of fast routines that you can then call from BASIC. There are easily enough libraries to provide just about any function you could want but even I was able to think of some more that are not there such as using opentype files, all the disc files are CODE files.

All together I think this a very well produced suite of programs I have not been able to mention all the feature here but I would recommend it to just about anybody who wants to use MODULA-2. The only two points I would mark it down on are the built in editor and the example programs provided which although they work very well are poorly commented and badly layed out in terms of indentation etc making them quite difficult to read.

The MODULA-2 compiler is available from MIRA SOFTWARE, 24 Home Close, Kibworth, Leicestershire, LE8 0JT, and costs £20 inc P&P (£1.00 extra outside Europe).

p.s. Please can we have a SAM version soon.

SAM COUPE DISC MAGAZINE

FRED

"Ridiculous value for money" - BOB BRENKLEY
 "Professional...Hilarious...Excellent" - CRASH
 "A veritable bargain" - YS
 "I recommend you get a sub today" - ENCELADUS
 "Unbeatable...Brilliant" - SCPDSA

GAMES-REVIEWS.
SCREENSHOTS-INTERVIEWS.
DEMOS and lots more

Contributors include: Chris White, Sean Conran, Colin Jordan, Masters Of Magic, Brent Stevens, Nick Roberts.

£1.50 per issue: £8.00 for 6 months: £15 for 12 issues

Send Cheques/Postal Orders payable to FRED

40 Roundyhill, Monifieth, Dundee, DD5 4RZ

SOFTWARE

SAM Coupé SOFTWARE - On 3 1/2" Disc

DRAGON TILES The thinking man's game. Always different, always taxing, the most addictive game so far written for the SAM Coupé. RRP £9.95
 Order Code SCD-01 Price £6.95

SAM DEMO DISC #1 Utilities, demos, screens, a game, and lots more. A real bargain for any SAM owner.
 Order Code SCD-02 Price £1.50

DISCIPLE/PLUS D SOFTWARE

Please state 3 1/2" or 5 1/4" disc

ARTIST 2 The best art package ever written for the Spectrum. 48K and 128K versions on the same disc with page maker and utility software. RRP £19.95
 Order Code SPD-01 Price £16.95

CONVERSION SOFTWARE Convert programs to full disc use. For GDOS/G+DOS users. You must have the original tape copy of the software to be converted. All require latest version of DOS. Supplied on tape - Price £4.50 each

TITLE	CONVERTS	ORDER CODE
ARTCON	OCF 48K ART STUDIO	FST-02
TASCON128	TASWORD 128	FST-05
TASCON+2	TASWORD+2	FST-06

LATEST DISCIPLE/PLUS D DOS VERSIONS

G+DOS 2a for PLUS D (ROM 1a)
 Order Code FST-90 Price £4.50
 GDOS 3d for DISCIPLE (ROM 3) Includes new set-up program, far easier to use.
 Order Code FST-91 Price £4.50

SAMSPEC SOFTWARE

SAM + Spectrum software on one disc. (3 1/2" or 5 1/4" - please state on order)

FONT LIBRARY #1. 100 screen fonts plus support software, easy to use on either computer. Special +3 disc available (Spectrum files only)
 RRP £8.95
 Order Code SSD-01 Price £6.95

MONEY MANAGER Advanced Personal Budgeting System for both machines. Spectrum version needs 128k/+2 (not +3/+2a). RRP £15.95
 Order Code SSD-02 Price £12.95

FORMAT

READERS SERVICES

HARDWARE

SPI. - SAM's Parallel Interface A full feature Parallel Printer Interface. Totally compatible with SAM's ROM and DOS printing routines and with utility programs like FLASH and TASWORD 2. The SPI has the added advantage of being BI-DIRECTIONAL so allowing information to be read into your Coupé from almost ANY other computer. Uses standard BBC lead (see below). RRP £21.95
 Order Code SPI Price £15.95

PRINTER LEAD Top quality parallel printer lead (BBC Standard). 2 meters long. For use with DISCIPLE, PLUS D or SAM. RRP £9.95
 Order Code PPL-01 Price £7.95

FORMAT BACK-ISSUES

Volumes 1, 2 and 3 of FORMAT now available only as complete volumes.
 Order Code FBI-V1 (Vol.1) Price £10.00
 Order Code FBI-V2 (Vol.2) Price £12.00
 Order Code FBI-V3 (Vol.3) Price £12.00
 All issues, from Volume 4 No 1 to the latest issue, are still available separately. To order quote the Volume/Issue # Price £1.50 each, (5 or more £1.25 per copy)

FORMAT BINDERS

Hardcover binders to protect your valuable magazines. Each will hold 12 issues, easy to insert/remove.
 Order Code FMB-01 Price £4.50

ORDERING

All prices include UK Postage and Packing. Overseas readers please add 10% to total order for extra postage. Please WRITE YOUR ORDER ON A PIECE OF PLAIN PAPER, and mark envelope ORDER. Clearly state Order Code; Title; Quantity required; price & add any postage as above. Remember to quote your membership number or we can't send out your order. Payment in STERLING by Cheque (UK bank), P.O., Euro Cheques or Cash. Make cheques payable to FORMAT. Payment MUST accompany order. Please allow 28 days for dispatch. FORMAT Publications will not be held liable for delays or non-delivery due to circumstances beyond its control.